THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. MARCH 4, 1897. CHICAGO, ILL. NUMBER

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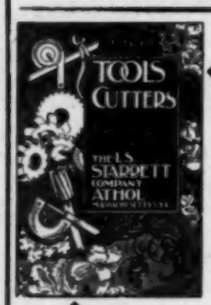

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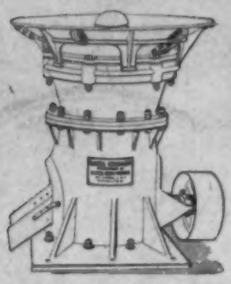

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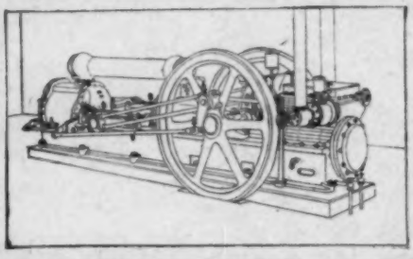

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THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. MARCH 4, 1897. CHICAGO, ILL. NUMBER 9.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The opening week of the third month of the year brings no significant developments from within the iron trade; but the iron industry, with all others, finds in the great event of the week much to build hopes upon. A new President, the prompt passage of a tariff bill and the advent of the season in which business starts, make a combination on which expectations may well be built. Conditions are such that no calculations need be made on a repetition of the experience of 1895, when the iron trade was exceptionally active, without a corresponding movement in other industries. The influences that will decide what 1897 is to be for iron and steel will now be largely external. One force, working from within, has made a large contribution to the year's business. And while it is probable that the effects of the sweeping away of the billet and rail pools have not yet been fully manifested, the trade will now look rather to the improvement of the general situation for signs of betterment in iron. So far there have been very faint indications of the business naturally to be expected in the wake of the rail orders. Somewhat more activity in cars is reported from Chicago and the railroad supply trade has responded measurably, while inquiry is growing in an encouraging way. Chicago also gives promise of a good tonnage of structural work, chiefly on railroad account. But in general, both as to prices and volume, the business in finished lines is thus far very unsatisfactory. Bessemer iron and billets hold the advances of from 25 to 40 cents gained in the past two weeks. The former, outside of some Northern Ohio purchases, has been quiet, but $10.25 in the valleys is the market, on three months' deliveries, with furnaces holding in most cases for higher figures. There is considerable negotiating in steel, with prices strong at $15.50 and upward, Pittsburg, and Eastern sales at $17.75, Philadelphia. Foundry and forge irons have no share in the Bessemer advance, and on some grades of Southern iron the quotation has relaxed 25 cents. No. 4 foundry has sold at $6.25, Birmigham, and while a large interest is still maintaining its figure on No. 2 iron, this is cut to $6.75 and even lower by others. The export movement has been somewhat less, by reason of higher freights. In January, the Government statistics show, the total export of pig iron from the United States, including that sent to Canada, was 10,191 tons, against 17,335 tons in December. Eastern furnacemen have had one meeting on a proposition to reduce production, and it is expected Eastern Pennsylvania and Virginia irons will be included in some arrangement for curtailment. The Lake Superior Bessemer ore producers are most persevering in their efforts to get a basis on which their organization can be continued, and a successful outcome at the next meeting is more than a possibility.

THE CLEVELAND DISTRICT.

The meeting of the Bessemer Iron Ore Association held in Cleveland last Monday brought the ore producers nearer to an agreement for 1897 than they have been at any time since the conferences began. Interests that had announced one week previous that they would wait but one week longer before announcing prices and seeking to make sales, were quite willing, in view of the developments at Monday's meeting, to adjourn again for eight days, or until Tuesday, March 9. The feeling was that the committee appointed to work meanwhile upon the still-remaining problems would be able to report a basis upon which union would be possible. There is an appreciation within the association, at least, of the gravity of the situation that would be precipitated by a disruption of the pool The sufferings of the miners in 1894 are still fresh in mind, and with another reckless scramble for orders regardless of getting back cost, such as was witnessed in that season, labor would be sure to suffer again. An open market means the postponement of buying by furnacemen, to avail themselves of the lowest price that may be reached, and meantime the closing down of many properties and further reduction of wages at those that continue. There is no danger, in any event, that such a mistake will be made as that of 1896; in putting the price above the level warranted by conditions. If the association continues, it has been quite well demonstrated in the conferences thus far, that it will only be on a price basis enabling the independent furnaceman to maintain himself under the new conditions. But the indications are, too, that the species of Carnegie-phobia which has been prevalent in some quarters will not prevent the ore producers from making due allowance for items of expense which even a consuming company must incur when it becomes a miner of ore. In view of Monday's meeting, it is fair to repeat what was said a week ago, that even though the Mesabi range, outside of the Carnegie-Oliver properties, is not in the new agreement, there will still be an association of old-range producers.

Pig Iron

Perhaps the pendency of negotiations for a new ore agreement has had its influence, at any rate the Bessemer pig iron market shows hesitancy. A purchase of 10,000 tons was made for a Northern Ohio steel works at $10.25 valley, and offers of $10.15 in this connection are said to have been declined. Otherwise the market has been without incident. Foundry grades are inactive and quotations remain within the limits noted below:

Bessemer	$10 90	Valley Scotch No. 1	$10 9 @11 15
No. 1 Strong Foundry	10 90@11 15	Valley Scotch No. 2	10 6 @10 75
No. 2 Strong Foundry	10 15@10 40	Gray Forge	9 50@ 9 75
No. 3 Foundry	9 90	Lake Superior Charcoal	13 50

Finished Material.

The wire and wire nail trades continue to show the largest activity in finished lines. On plain wire, $1.10 to 1.15 is the maket; wire nails are held quite firmly at $1.35 in carload lots, Cleveland. On rods, the local quotation is $21.50. A large inquiry for steel is reported from a local wire and wire nail interest, but the transaction is not yet closed. In bar iron some business is going on a basis of 1.05c, Cleveland, for car load orders and 1.10c for less. The association distributed its assets at the last meeting and the race has since been an open one. Plates are firmer with some mills, and 1.10c to 1.15c Pittsburg represents recent transactions, while some quotations on open-hearth stock have been $1 a ton higher. Current business in this line is light. Sheets are maintained fairly well. The mills booked some good orders in January and February, but lack specifications. We quote 2c for No. 27 black. Roofing and galvanized work are expected to show fair activity soon. Structural orders aggregating several hundred tons are beconingured on locally, but no large single contracts.

CHICAGO.

OFFICE OF *The Iron Trade Review*, }
1142 MONADNOCK BLOCK, March 3 }

Market conditions continue to improve with every week. The heaviest buying since the collapse of the rail pool has been from railroads and includes, in addition to the large tonnage of rails placed, orders for several thousand cars and for quite a heavy tonnage of track supplies. The largest buyer of cars has probably been the Baltimore & Ohio system, which has placed orders with several of the Western car builders, the total approximating 6,000 cars. The Northwestern system has bought 2,000 cars, and several of the other roads and transportation companies have placed orders in lots of 1,000 cars or less. All of this means a large consumption of steel and iron, and contracts for a good deal of the material have been placed in the last two weeks. Mining and lumber companies are preparing for a much better business and have been ordering freely the various supplies they need, including quite a large tonnage of light section rails. In structural material business is also improving and several good contracts are under consideration at the present time while others are projected. The raw material market exhibits improvement in an increased number of inquiries, particularly for small lots.

PIG IRON.—A good many buyers who have been in the habit of placing contracts for several months' supply have lately been and are now buying iron only as they need it, but judging from the increased inquiry for small lots from this class of consumers their needs are growing larger all the time. The number of inquiries received for small lots increases every week and the size of the inquiries also grows. In February the shipments from local furnaces were not up to the production and were smaller than had been expected. The indications point to larger shipments in March. Both Northern and Southern furnaces are very firm in their views and no sales are being made lower than the quotations given:

Lake Sup. Charcoal	$13 50@14 00	Southern No. 1 Soft	$10 90@11 40
Local Coke Fdy. No. 1	11 50@12 00	Southern No. 2 Soft	10 65@10 90
Local Coke Fdy. No. 2	11 00@11 50	South'n Silveries	11 40@11 65
Local Coke Fdy. No. 3	10 75@11 00	Jackson Co. Silveries	14 00@16 00
Local Scotch Fdy. No. 1	11 50@12 00	Ohio Silveries No. 1	15 00@15 50
Local Scotch Fdy. No. 2	11 00@11 50	Ohio Silveries No. 2	14 50@15 00
Local Scotch Fdy. No. 3	10 75@11 00	Ohio Strong Softeners	14 00@14 25
South'n Coke No. 1	11 15@11 40	Alabama Car Wheel	16 00@16 50
South'n Coke No. 2	10 65@11 15	Malleable Bessemer	12 00@12 25
South'n Coke No. 3	10 40@10 65	Coke Bessemer	13 00@13 50

BAR IRON.—The car orders placed recently have had a beneficial effect upon the bar iron market and have caused the placing of several contracts for large lots of iron. Prices are unchanged. The Merchant Bar Iron Association no longer governs the prices of iron and the market is an open one. Quotations are made as follows: Common iron, 1.25c to 1.30c; soft steel bars from strictly billet stock, 1.15c to 1.25c.

RAILS AND TRACK SUPPLIES.—Inquiries continue to be received for small lots of standard sections, but the business placed has been limited. Mining and lumber companies and street railroads have lately placed a large tonnage of small orders for light rails and this class of business is improving all the time. Quotations are made as follows: Rails, $21 to $24, according to specifications; steel splice bars, 1.20c to 1.30c; track bolts with square nuts, 1.95c to 2c; hexagon nuts, 2.05c to 2.10c; spikes, 1.65c to 1.75c.

BILLET AND RODS.—The demand for billets is not large and only a few small sales have been made. There is an apparent shortage of rods, as several buyers have been shopping very widely for their requirements without being able to place their orders. The market on both billets and rods is very firm. Quotations are made at $17.50 to $18 for billets, and $24 to $24.50 for rods.

STRUCTURAL MATERIAL.—Several of the Western roads have lately quietly placed orders for bridges with local bridge building companies and this business is now being felt by increased sales of material. The various large contracts noted in this column lately have not yet been placed but will undoubtedly be closed soon. The Rock Island has asked for bids on about 4,000 tons of material for track elevation. The Northwestern Elevated will place an order in the near future for about 2,000 tons of material. Generalbusiness is improving steadily and orders on old contracts are better every week. Quotations are as follows: Beams and channels, 1.75c to 1.80c; angles, 1.25c to 1.30c; plates, 1.25c to 1.30c; tees, 1.50c to 1.55c. Small lots from stock are quoted ¼c to ½c higher.

PLATES.—The demand has been quite a little better the last week and several good sized contracts have been taken, both for mill and store shipment. Prices are made as follows: Tank steel, 1.25c to 1.30c; flange steel, 1.35c to 1.45c; firebox, 2c to 5c.

SHEETS.—The market shows a little improvement and buying shows a gain over a week ago. Quotations are made at 2.15c to 2.20c for No. 27 black and 80 to 80 and 5 per cent discount for galvanized.

MERCHANT STEEL.—The demand is somewhat better than it has been and buyers are apparently more willing to consider placing contracts. It is expected that a decided improvement will be had in the near future. Prices are as follows: Open-hearth spring, tire and machinery steel, 1.85c to 1.95c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.35c to 1.65c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

OLD MATERIAL.—No business of any consequence has been placed in old wheels but there has been some demand for old rails. In other classes of scrap the demand is limited and very little buying has been done. Prices are made at $12 and $12.50 for old iron rails, $8.50 to $9 for old steel rails, and $10 to $10.50 for old wheels. Miscellaneous scrap is quoted about as follows: Railroad forge, $11.50. to $12; dealer's forge, $10 to $10.50; No. 1 mill, $7 to $7.50; heavy cast, net ton, $7.50 to $7.75; malleable cast, net ton, $8.50; axles, $13; cast borings, $3; wrought turnings, $4; axle turnings, $5.50 to $6; mixed steel, heavy, $7.50; stove plates, $5.50; heavy melting steel, $9.00 to $9.25.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, }
807 TRADESMEN'S BUILDING, March 3. }

Almost every mill in the Pittsburg district has been temporarily disabled by the high waters of the past week, and some few will be unable to resume for several days. Finishing mills generally are stocking their product and report fewer orders now booked than for many months. The Tinned Plate Manufacturers' Association is to give place to a new organization, and a reduction in prices is announced, pending further action April 6. The Canadian Pacific rail purchase of 60,000 tons announced last week has renewed speculation as to the operation of the Duquesne mill. Bessemer pig and billets continue their encouraging aspect, in spite of the fact that little business in either has been closed in the week, though in billets some large deals are being figured on. Rods are higher and in much better demand.

PIG IRON.—So far only a few of the many inquiries for Bessemer pig which were current last week have materialized in transactions, and the week's record of sales is not large. Brokers and furnacemen have been informed that the Northern Ohio concern reported in the market last week has covered its wants, but the amount purchased and the selling furnace are not disclosed. The valley steel interest, which was feeling the market last week, will not buy at present prices. Sales for the time being have subsided but the firm tone of the market is not changed. The purchase by the leading local interest of 10,000 tons of basic iron and 7,500 tons of low phosphorus iron to cover Eastern contracts is the real basis for the rumored purchase of Bessemer by this interest. Furnacemen are still firm in their demands for $10.25 valley as a minimum and asking prices range above this figure. Sales are reported of 3,000 tons at $10.15 valley and 1,500 tons at $10.20 valley, March and April delivery. For near deliveries Bessemer is firm at $10.75 to $10.90, Pittsburg, with few sales of any size reported. Lots of No. 2 foundry are reported sold at $10.25 to $10.50. Gray forge at $9.50 is in slight demand. We note a sale of 1,000 tons at $9.50, Pittsburg. We quote, f.o.b. Pittsburg, the valley freight being 65c.:

Bessemer	$10.75 to $10.85
No. 1 Foundry	11.00 to 11.25
No. 2 Foundry	10.50 to 10.75
No. 3 Foundry	10 00 to 10.25
Gray Forge	9.50

BILLETS AND RODS.—Activity in all lines of wire production has created an unusual demand for rods. Prices have materially stiffened and are held at $21.25 to $21.50, maker's mill. Sales of billets continue to be made and prices are maintained easily at $15.50 to $15.75. A number of interests are following the billet market closely and several deals are in tentative

shape, with conversion attachments in one or two cases. The feeling continues firm. Two inquiries for 12,000 tons each are still uncovered.

Rails and Track Supplies.—Additional rail orders are being taken by the Pittsburg mill, the most conspicuous of late being 60,000 tons sold the Canadian Pacific at Montreal. Edgar Thomson is again on double turn after a two days' shut down from high water. Prices on rails are nominally held $20 Pittsburg, $21 Chicago, only attractive business receiving attention. Splice bars and fish plates are active. We quote: Splice bars, 1.40c to 1.45c; track bolts, iron, 1.95c to 2c; steel spikes, 1.65c to 1.75c.

Structural Material.—Two Buffalo contracts are hanging in which local mills are interested and which will be finally awarded soon. The viaduct, made necessary by elevating railroad tracks, will require 2,300 tons of material and the Northwestern Elevator will call for 1,000 tons of beams, beside other shapes. Bids for the former have been opened and tabulated but no contract has been awarded. Bridge requirements from Colorado call for 1,700 tons, and this will be covered before long. Inquiries as to the stability of the beam pool continue to be heard but no leakage can be detected. Sales at 1.35c continue on old contracts which are still effective, but no evasion of the agreement is reported. Prices continue: Beams and channels, 15-inch and under, 1.55c; 20-inch, 1.70c; 24-inch, 1.75c; angles, 1.10c to 1.15c; tees, 1.35c to 1.40c; zees, 1.30c to 1.35c; universal plates 1.10c to 1.15c.

Bars.—The open market on bar iron has little effect on the volume of business done. Pittsburg mills report less business on the books than for many months. In some quarters there is demand reported in steel bars but local mills, holding 1.05c and 1c as a minimum, are closing little business. Common bar iron is quoted at 1.10c, Youngstown, and 1.15c is asked here. We quote steel bars 1c to 1.05c. Muck bar is quoted at $19 to $19.50 and no trading is reported.

Plates.—The Buffalo elevator, referred to elsewhere, will require a considerable tonnage of plates, and estimates have been submitted by local mills. The volume of business current is not composed of large orders but is of fairly steady proportions. We continue to quote: Tank, 1.15c to 1.20c; shell, 1.25c to 1.30c; flange, 1.35 to 1.40c. The above quotation on tank is shaded by some mills.

Wrought Pipe.—The increased buying of the last two weeks shows indications of being for present needs only. The buying of the last week has been meager and confined to merchant pipe. Quotations are continued: Merchant pipe, 57 to 67 per cent; galvanized, 50 to 55 per cent; on car load lots, six tens; less than car load lots, five tens and five per cent. On merchant boiler tubes we quote: Two and a quarter inches and smaller, 70 and 10 per cent discount; two and a half inches and over, 75 and 5 per cent discount; casing, inserted joints, 57½ per cent discount; screw and socket joint, 62½ per cent discount.

Sheets and Tin Plate.—A provisional organization of a new tinned plate manufacturers' association was effected here last week, and its announcement of reduced prices was only in keeping with the recent action of individual members, who have almost totally disregarded the agreed price of $3.65 per box on coke plates. Business in tin plate is reported fairly good. On black and galvanized sheets occasional spurts of orders are had, and buyers would close for future delivery on good sized orders. No change in the general trend of business can be noted. Galvanized are quoted at 80 and 80 and five per cent off list. Black sheets are unchanged in price and are quoted as follows: No. 26, 1.90c to 1.95c; No. 27, 2c to 2.05c; No. 28, 2.10c to 2.15c.

Merchant Steel.—But for improved demand for soft steel bars there is no change in merchant steel. Some grades of tool steel are in slightly better demand. We quote: Machinery steel, 1.30c to 1.35c, base; sleigh shoe, 1.30c to 1.35c; soft steel bars, 1.20c; machine straightened, tire, 1.30c to 1.40c; spring, 1.30c to 1.35c; open-hearth spring, 1.55c to 1.60c; toe calk, 1.45c to 1.55c; tool steel, common, 5c to 7c. Special brands, 10c and upwards.

Iron and Steel Skelp.—We quote: Grooved steel skelp, 1c to 1½c; sheared, 1.07½c to 1.10c; grooved iron skelp, 1.15c to 1.17½c; sheared, 1.30c to 1.35c.

Old Material.—Sales of old material continue few and of small proportions. Under ruling conditions prices are merely nominal, but stocks when sold bring above the following prices: Wrought scrap, No. 1, $10.25 to $10.50; old iron rails, $13 to $13.50; old steel rails, $10.50 to $11; cast scrap, $10 to $10.25; hammered iron axles, $15.50 to $16, net; rolled iron axles, $13.75 to $14; machinery cast, $9.75 to $10; heavy melting stock, $12 to $12.50; coil spring, $10.50 to $11; leaf springs, $13.25 to $13.50; car wheels, $10.25 to $10.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Philadelphia. A meeting of the Eastern Pig Iron Association held here Feb. 23, discussed measures for the curtailment of pig iron production in Eastern Pennsylvania and Virginia. A committee will submit to the various producers the plan which was formulated and a later meeting will be held to endeavor to make it effective. Quite a little pig iron has been sold in the past few weeks but prices do not improve. Negotiations are still pending on several considerable lots of iron. Buyers, however, in view of the large stocks in makers' hands, are not hurrying matters. Seaboard quotations continue to be made on the following basis: No. 1 X foundry, $12.75 to $13.25; No. 2 X foundry, $11.75 to $12.25; No. 2 plain, $11.25 to $11.50; standard mill irons, $11 to $11.25; ordinary mill irons, $10.75. The latest transactions in billets have been at firmer prices. Sales are reported at $17.50 and $17.75; makers' prices are now at $18 to $18.25, with some negotiations reported pending in the Pittsburg district for a considerable tonnage. Plates and shapes are the most active parts of the finished material market. For the former several orders have been taken, including 500 tons for the Baldwin Locomotive Works. Inquiries for 1,000-ton lots are out, but the carrying through of the work is not a certainty. Shapes are in fair demand, with an improvement in tonnage. Plans that have been deferred are beginning to be talked about and some developments are expected in the next two months that will benefit the structural mills. Prices on plates are unsatisfactory. For tank steel 1.20c to 1.25c is quoted, and some boat work has been taken at 1.15c. Bars are 1.12½c to 1.15c in car load lots. The inquiry for skelp is increasing and a good business is promised for March. Old material shows somewhat more business but at lower prices. Sales are reported at $12.75 to $13 for No. 1 railroad scrap, $13 to $13.50 for iron rails, $11.50 to $12 for steel and $10.50 for car wheels. There is more inquiry for No. 2 light scrap, with sales at $8 to $8.50, borings at $7 to $7.25 and turnings at about $8, delivered buyers' yards.

Cincinnati. The expectation that the stimulus given the rail market would beget activity in other lines has not been realized in any marked degree as yet. General conditions seem improved but the uncertain feeling as to the future holds back investors and there is no immediate prospect of a broad movement. Foundry and mill irons have not shared the advance in Bessemer. In the main the leading Southern brands are firm at prices heretofore quoted, but a sale of 10,000 tons of No. 4 foundry is reported at $6.25, Birmingham, though for some time previous the seller had been holding at $6.50. Stocks of Nos. 3 and 4 have been accumulating. No. 2 is still maintained, however, at $7, furnace. The higher freight asked on foreign shipments and the slight decline in English iron have restricted the outward movement. We quote, f.o.b. Cincinnati: Southern coke, No. 1 foundry, $10.25 to $10.50; No. 2, $9.75 to $10; No. 3, $9 25 to $9.50; gray forge, $9 to $9.25; mottled, $8.75 to $9; No. 1 soft, $9.75 to $10; No. 2, $9.75 to $10; Hanging Rock charcoal, No. 1, $15 to $16; Tennessee charcoal, No. 1, $13 to $14; Jackson Co. silvery, No. 1, $13 to $14; standard Alabama car wheel, $14.75 to $15.50; Tennessee car wheel, $13.50 to $14.50; Lake Superior car wheel and malleable, $14.75 to $15.25.

The National Tin Plate Co., according to an Anderson, Ind., dispatch, has closed a contract for a new tin plate plant to be erected near Pittsburg. The Pittsburg district plant will give the company access to the Eastern market, from which present freights debar it.

Plans are being made for an addition 50 x 200 feet to the plant of the Falcon Iron & Nail Co., Niles, O., to contain six annealing furnaces and other equipment.

THE IRON TRADE REVIEW

DEVOTED TO IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES.

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A NEW ERA.

Before this issue reaches its readers, Wm. McKinley will have become President of the United States, and with his inauguration the new era will have been entered upon, which has so long existed in anticipation. The auspices under which President McKinley takes up his great responsibilities are very different from those attending the second entrance of Grover Cleveland to the White House four years ago. Then the heaping tide of prosperity hid dangers that so soon after began to reveal themselves. Partisanship had been so intense in the struggle that preceded, that the business world was loth to accept the predictions so freely made, of the disasters that would follow the tearing down of the protective structure. But the prophecy of early '93 is history to-day—four years of the bitterest experience the country has ever seen, next to the four years of its civil war. It is all too familiar to be retraced now. But one result which we would emphasize here is the practical unanimity of the great business interests of the country, that is one of the most favorable omens for the new administration. Intense partisanship has given way to an intense desire to restore to the American people the prosperity they once knew.

Grave, indeed, are the problems that confront the new administration. But there is much to build upon, in the widespread and patriotic desire for its success. The American people have learned, in community of loss and of direst hardship, that only by united striving can they come again into their old estate. No President has so appealed by his personality and his public record to the favor of men in all parties, and none, we believe, will be so strongly supported by the whole people in his efforts to restore the reign of "good times" throughout the land.

With the large balance now to the credit of the gold reserve fund; with an unparalleled trade balance in our favor; with four years of liquidation behind the business world, and industry and trade on a sounder basis than in years; with a large present and prospective foreign demand for American breadstuffs and other commodities; with the permanence of the existing monetary standard made surer than ever; finally, with confidence restored and an expectation, at home and abroad, of a revival in all lines of manufacture and trade—with such conditions attending his inauguration, President McKinley can well thank God and take courage.

And now for an extra session, a protective tariff, quickly made and quickly operative—and then to business, to larger employment of labor, and at length to some semblance of the prosperity to which our people too long have been strangers.

THE WAGE EARNER'S STAKE IN THE TARIFF.

The day was when the claim by protectionists that the tariff is a question of wages was answered with a sneer at what was called the plausible pretense of interested capital. The tariff hearings recently held at Washington furnish two incidents that attest the truth of the claim; but as is often the case the fact becomes palpable and incontrovertible only after the discussion involving it has passed in large measure out of the popular mind. It will be recalled that the Tinned Plate Manufacturers' Association, while it urged an increase in the duty on tinplate, before the sub-committee, was not strenuous about a large advance. Indeed some members would have considered an additional 2—10c. sufficient, and the average sentiment of the manufacturers was for a duty of 1.5c. It remained for a delegation of tinplate workingmen to urge a higher duty than that proposed by the manufacturers, and on the ground that while the latter might be able to compete under a duty but little more than to-day's, there was much at stake for the tin-plate workingmen of the country, and to give them some assurance against wage reductions in the United States following any that might come in Wales. an amply protective duty was necessary.

The second case in point was the interview between Senator Burrows, of Michigan, and the subcommittee of the House. In response to the Senator's inquiry as to the iron ore tariff it was stated that it would likely be left as at present; that the iron ore interests had been notified of the hearings and had made no request for a change. The Senator is represented as replying that his interest was not so much in the companies, for the probabilities were that they could get along; but he wanted the committee to consider whether the present tariff was high enough for the wage-earners—the men who went into the mines—for it was their interest that he especially represented.

We have some recollection of the bitter invective indulged by sundry editors not so long ago, against manufacturers whose profits were said to be simply made for them by a protective tariff; and it was urged that the wages of employes of such industries had no relation whatever to the size of the tariff. If we recall correctly certain Presidential messages were written in similar strain. Certainly a suggestive commentary on the relation of a protective tariff to employer and employe is furnished in these fresh leaves from our tariff-making history. Probably were the search now to be made for those who

once met the wage arguments of protectionists with bold denials, they would be found to have gone to join that other gallant army who in one breath denied the existence of a tin-plate industry in the United States and in the next promised to "drive it back to Wales, where it belongs."

THE LABORATORY AND THE FURNACE.

Our large steel works in Pittsburg, Chicago, and at other points, are already alive to the value of laboratories, and the Alabama iron masters, who had in the early stages of their iron industry suffered enormous losses for the want of chemists at their furnaces, have made a beginning in the right direction; as a consequence last year the Tennessee Coal & Iron Co. made from native ores some 60,000 tons of high-grade basic pig-iron, conforming to very stringent specifications—a feat wholly unattainable without the aid of the chemist. Now in a fit of misguided economy this company is about to reduce its force of chemists to a point that will scarcely be sufficient to do the most necessary analytical work and which must forbid that original research which is at the foundation of all intelligent modern progress. Instead of reducing its force and allowing its efficient chief chemist to leave, this company would be practicing a true economy by improving its laboratory and and furnishing him with more assistance and facilities for original investigation.—[Engineering and Mining Journal.

Not only would the sale of nearly $400,000 worth of Alabama basic iron to Northern steel makers have been impossible without guaranteed analyses, but the tendency among consumers of foundry grades is more and more to insist upon specific information as to the composition of the irons they buy. The old-fashioned plan of grading on strength, color, fracture and granulation answered in its day, but its day is done. It makes a difference to the buyer whether his No. 3 foundry iron carries 2 per cent silicon or runs up to the ferro-silicon borderland, with 3.75 Si.; and a variation from 0.03 to 0.09 in sulphur would prove serious in a soft iron. Yet only the laboratory can keep the grades right in these particulars.

It is not a time for a backward step by the leading Southern producer, now that the whole foundry world is moving forward. The producer cannot stand in the way if he would. And while questions of administration are no concern of the public, the moral effect of the new policy of the largest Southern company is a matter in which the iron trade will take a lively interest. The advances by Southern pig iron producers, both on the technical and the commercial side of their practice, in the past half dozen years have been generally recognized and commented upon. The scientific branch of the business has been given due prominence and credit for these achievements. Moreover, the original investigation conducted in the laboratories of the Tennessee Company has been an important contribution to the better status of Southern irons and the better repute of Southern iron-making methods. Naturally there is surprise at the recent exhibition of economy in this most important department, in the midst of a campaign for foreign markets, and in the face of the sharp competition from Northern foundry irons, that promises to grow even sharper under the lower prices for ores that will prevail in 1897.

H. M. Curry, of the Carnegie Steel Co., Ltd., is spending some weeks at Palm Beach, Fla.

Hon. Edward Ellis, president of the Schenectady Locomotive Works, died Sunday, Feb. 28.

M. M. Garland, president of the Amalgamated Association of Iron and Steel Workers, is an applicant for the position of commissioner of immigration. This officer is appointed by the President and is stationed at Ellis Island. The salary is $6,000. It is said that Mr. Garland's chances of receiving the appointment are excellent.

AN IRON MAN IN THE SENATE.

MARCUS A. HANNA.

The fact that M. A. Hanna, of the well-known iron ore, pig iron, coal and vessel firm of M. A. Hanna & Co., Cleveland, takes his seat in the United States Senate this week makes timely the presentation of the good portrait of him which appears above. So many caricatures of Ohio's new Senator have been printed that the iron trade will be interested in seeing a real likeness, and we take pleasure in presenting one. Mr. Hanna is in his 60th year. With his vigor of mind and body and his rare business instinct and command of affairs, he promises to be a conspicuous factor in legislation, under a business men's administration. Iron manufacturers in Congress are rare, and the records of the United States Senate would show an exceedingly scant representation of that industry at any time in the history of our Government.

Personal.

Andrew Carnegie has been quite ill of pneumonia the past week, and a consultation of physicians was held on Sunday, but later reports indicate a considerable improvement.

Dr. Wm. B. Phillips on March 1 severed his connection with the Tennessee Coal, Iron & Railroad Co., for which he has been consulting chemist through the past five years. Dr. Phillips has carried on important lines of research in connection with his work and has made valuable contributions to the advance of the Southern iron industry along technical lines. He has opened an office at 311 Chalifoux Building, Birmingham, Ala., for the examination of mining property, reporting on technical processes, such as coal washing, saving of waste products, etc., and in this field will no doubt find the recognition due his ability and experience.

Alfred and Leonidas Merritt are now at Guadalajara, Mexico, looking after silver mining properties that are reported very promising.

Wm. Garrett has severed his connection with the Illinois Steel Co. and it is announced that he will devote himself to the practice of rolling mill engineering, making Cleveland his headquarters.

Andrew Brady, late superintendent of the Bird Coleman Furnaces, Lebanon, Pa., will succeed F. L. Grammar at the Colebrook Furnaces of the Lackawanna Iron & Steel Co.

John S. Unger, late assistant superintendent of the armor plate department of the Carnegie Steel Co., Ltd., has been made superintendent of the same department, filling the vacancy caused by the promotion of William E. Corey to the superintendency of the Homestead Steel Works. Mr. Unger is a young man and has been connected with the company 12 years, being originally a chemist at the Edgar Thomson Steel Works and later chief chemist of the Homestead Steel Works. A year ago he was made assistant superintendent of the armor plate department.

Edward Florada, who has managed the Oliver mine on the Mesabi range in the past few years, will also act as general manager of the Mountain Iron.

DUQUESNE FURNACES AND STEEL WORKS.

To the London *Iron and Coal Trades Review's* series of articles on "American Iron and Steel Works," Mr. Franklin Hilton contributes the following data concerning the great blast furnaces and the steel works at the Duquesne plant of the Carnegie Steel Co., Ltd.:

Whether we view them from the standpoint of the pig-iron maker, of the steel manufacturer, or of the electrical engineer, the works of the Carnegie Steel Co. at Duquesne, which I had the privilege of seeing while in the United States, are singularly complete, and represent perhaps the most advanced practice in existence at the present time. Indeed, it is probable that the innovations and improvements now or recently introduced at Duquesne will be a finger-post, and perhaps the most important guide hitherto or otherwise furnished, as to the principles and policy which must guide the pig-iron maker or steel manufacturer who in the future aspires to be up to date and to keep his head well above water.

Blast-Furnaces.—This is an entirely new and perfectly unique plant. There are four furnaces, 560 feet apart, 100 feet high, 20 feet width of bosh, 12-feet wells, and 10 tuyeres. Each furnace has four Cowper stoves, 90 feet high and 20 feet diameter, with a flame flue in the center, and a separate stack to each. For each furnace a separate covered casting-shed is provided with a tramway for carrying the charges, usually consisting of five tons of ore in a tub or box, filled from the depot shoots, from an ordinary filling level on the floor line to the top of the furnace, tipping automatically on to a bell or cone, and dispensing entirely with fillers and chargers. Each of these mechanical fillers has a separate steam haulage engine. The ore-boxes used for charging the furnaces are fitted with an inverted bell or cone. Each pair of furnaces has its separate battery of Babcock & Wilcox tubular boilers and blowing engines. Over each of the latter are 25-ton electric traveling cranes. The engines are of the usual vertical self-contained compound condensing type, with 28-inch and 42-inch steam cylinders by 5-feet 6-inch stroke. The beams, which weigh 30 tons each, are placed intermediately. The fly-wheels weigh 40 tons each. The engines, of which there are five in pairs, with one pair always in reserve, are built by Allis & Co., a well-known American firm.

Besides the blowing plant just named, there are four pairs of vertical compound condensing pumping engines—each fitted with a 10-ton motor crane—to the water tower for the supply of the tuyeres. The water tower is of wrought iron, and 120 feet high. A pig-iron breaker is provided for each furnace, and the pigs are cast in chills 26 feet long. All the overhead cranes and the pig-iron breaking machines are driven by electric motors. Separate motors are provided for incandescent and arc lighting. Next to the stoves are the coke depots, traversed by crane roads. Then come the ore depots, which are double, and the stock yard for ore and coke. The ore and coke depots are 400 feet long. One of the features that arrested my attention was the fact that all the iron-work was painted with red oxide.

The ground upon which these furnaces are located was practically a sunken marsh. Piles were driven for the principal foundations, and some of them are about 30 feet in depth. The foundations are of enormous extent and solidity, and will cost probably as much as the whole of the superstructures. The construction was completed in a remarkably short space of time, electric light being used at night and a great force of men employed. It would appear as if the constructing engineers had been given carte blanche to make these foundations of the size and strength desired without any regard to cost. To an engineer, it seems a pity that the masonry will be almost entirely hidden under ground when the furnaces are completed. The stock yard is excavated to a distance sufficient for two additional furnaces, and there is ground enough reserved to extend the plant ultimately to embrace six furnaces.

The new furnaces at Duquesne have more than realized the anticipations formed as to their ouput. It was expected that they would produce an average of 500 tons a day per furnace, but since they were put in blast they have done more than that, and one of them has produced over 600 tons daily. The plant of four furnaces may be regarded as equal to an output of about 800,000 tons of pig-iron per annum. To us, in Europe, the question is naturally suggested by this enormous yield is that of how it has been accomplished, and what about its economical results.

In most of the American furnaces that have been distinguished for specially large yields exceptionally rich ores are made use of. Rich ores yield economy in at least three different ways—less fuel, less flux, and more easy reduction. It is obvious, moreover, that if less fuel and flux are required the labor cost of handling the raw material will be less, and, as less slag is produced, the expense of a tip for this effete material and the cost of handling it are also less. It is also obvious that as richer ores occupy less space in the blast-furnace, with less fuel and flux, they permit of more rapid driving, and in American practice it is held to be axiomatic that rich ores show a smaller cost per ton of product for interest on plant, management, and other fixed charges, owing to the fact that such costs are levied on a greater tonnage than otherwise.

The cost of the new plant at Duquesne is understood to be from £140,000 to £150,000 per furnace, which is, no doubt, the largest amount ever expended in a plant of the kind, and suggests some points for investigation by blasting furnace engineers, when compared with the cost of British furnaces of the most modern design and construction, which may be taken at not more than £50,000 per furnace. There can be no doubt that the Duquesne furnace plant will allow pig-iron to be made very economically. Indeed, hematite pig-iron is now being made at Duquesne at a price which will, I believe, allow of its being exported to England in competition with English hematite pig.

The Bessemer Steel Works.—The Duquesne Steel Works, the most recently built of the series owned by the great Carnegie Steel Co., are located close to the new blast-furnaces at Duquesne, on the opposite side of the Monongahela River from McKeesport and about two miles below. The entire product is made into billets and bars, and for this purpose the mill is probably the finest in the world. With only two nominally 10-ton converters, but really 8½ tons, as much as 38,000 tons of ingots have been made in a month, and the world's record for a two-converter plant is held. The ingot molds are carried on cars, as at McKeesport; the ingots are heated in vertical furnaces, and are then rolled directly in a series of mills without reheating into various sizes of billets and bars. The ingots are 17½ x 19½ inches in cross-section. They are first bloomed in a reversing mill in 15 passes down to about 7 x 8 inches, and the bloom thus made has its ends sheared off and is cut into two pieces. These are instantly carried by conveyors into a roughing mill, where they receive five passes, both blooms passing through the rolls at the same time in adjoining grooves. The two blooms can be sent into different finishing rolls, and in regular practiceone bloom is rolled into 4 x 4-inch billets and the other into sheet bar for tin-plate, about 6 x 1-inch in section. In the complete mill there are in all seven stands of rolls, each driven by a separate engine, in some of which only a single pass is made. To roll an ingot of 17½ x 19½ inches down to 1½ inch square billets requires 26 passes in the eight stands of rolls. Only the first three sets of rolls are tandem, and the others are placed in two parallel lines, so that the billet or bar in its movement through the mill from one stand to the other passes first forward, then back, then forward again. All the passages are made apparently automatically on power-driven rollers, the only labor required being the movement of the valves of engines and the levers controlling the lifting tables and feeding rollers.

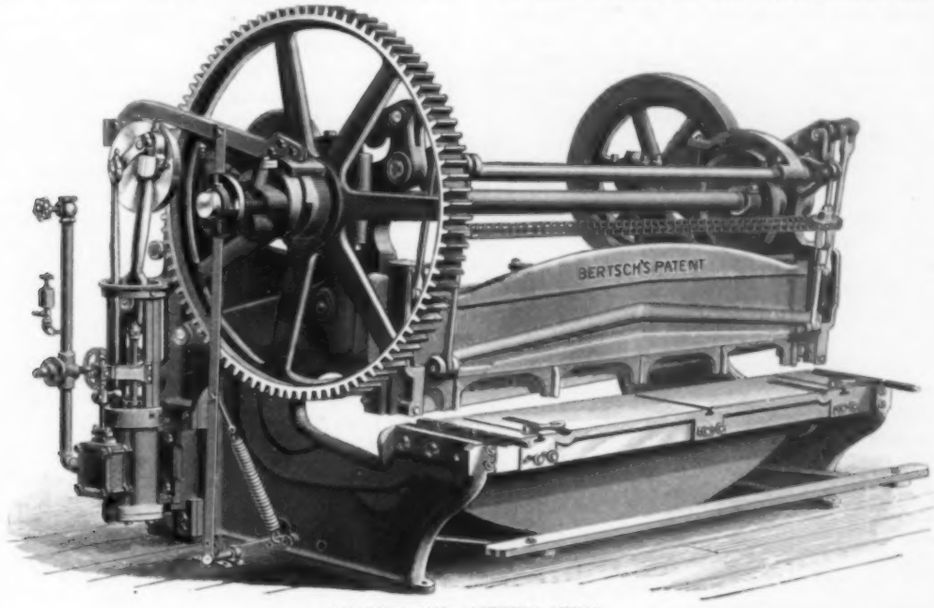
After the billets or bars are sheared to length they find their way to the railroad cars in which they are shipped by automatic arrangements. The 4-inch billets drop one by one as they are sheared on to a continuous train of rollers joined at their axles by links, which travel up an inclined track formed of I-beams, then horizontally on an overhead track parallel to the railroad. Switches are provided at several points on the roller track by which the billets are caused to leave the track and fall into a number of inclined bins or chutes, where they are cooled by a jet of water, and finally, by opening a gate at the bottom of the bin, they fall into the railroad car.

The sheet bars are treated differently. They are cut into lengths of about 30 feet, and carried on to a cooling table formed of a number of parallel railroad bars elevated about 3

feet above the ground level. They are moved along this by a couple of endless chains, which travel at each end of the cooling table, and are finally carried in like manner directly into the railroad cars in which they are shipped. Only a small number of men is required to ship the great product of these works, amounting to from 1,200 to 1,400 tons per day.

The most prominent features of the Bessemer shop at Duquesne are the large radius of the casting-pit, the large number of casts—82 of 9 tons each—per shift, and the fact that all the metal used, up to the time of my visit, was cupola melted, the cupolas being tipped into a ladle upon a ladle carriage, and thence weighed and tipped into a curved spout to the nose of the vessel. The ferro-manganese is heated and thrown into the ladle. The ingots are 17 inches square at the bottom, and are cast upon bogies running upon a depressed narrow-gauge railway for stripping away. The blast used is about 23 lbs., the duration of the blow being about 15 minutes. All the machinery is actuated by hydraulic pressure.

Billet Mill.—In this mill there are, as above stated, seven different mills or trains of rolls upon four different center lines, viz.: 1. The cogging mill, from 17 inches to 18 inches square ingots. 2. Two pairs of roughing rolls, blooms cut in three lengths. 3. Three pairs to 4-inch billets, and 2½ x 3 square. 4. One pair to 1¾-inch finished bars. No reheating is adopted. The blooms are cropped at the cogging mill and 4-inch billet mill. The latter are cut into 24-inch lengths, the 1¾-inch billets being run 20 to 30-feet lengths, while the 4-inch are traversed upon live rollers up an inclined plane to the shoots; then cooled down, and, by lifting the bottom shutter, are made to slide into trucks. There are separate engines to each train, except the 1¾-inch finishing mill. The output last year was 400,000 tons, with one man in each mill.



SQUARING AND SLITTING SHEAR.

SQUARING AND SLITTING SHEAR.

The illustration shows a general-utility, quick-acting shear for light and heavy sheet metal work and for rolling mill uses. It is manufactured by Bertsch & Co., of Cambridge City, Ind. It is built to be operated with gearing or for operation direct from engine. Various lengths are made up to 11 feet. The throat is 15-in, 18-inch or 21-inch, to slit 42-inch sheets lengthwise in the center or cut strips as desired. For rolling mills the shear is made extra heavy, with 50, 63, 102 or 124-inch blades for cutting plates or packs eight or 10 feet long in one or two cuts.

The improvements to be particularly noted are the quick-acting, automatic hold-down, an automatic clutch, patent extension drop-leaf tables, with trimming and slitting gauge and shear line indicator, patent center bearings behind the knife-bar to prevent springing, safety knife-bar arrangement and patent shearing table adjustment. The patent knife-bar arrangement is designed to prevent straining or breaking of parts should either end of the driving mechanism be disconnected or broken from any cause, in which case the opposite end of the knife-bar, and driving mechanism can freely run on, independent of the other, and make the complete stroke and stop when the blade is up. In other words, the knife-bar driving mechanism can be disconnected at either end, and operate the shear with safety, without locking, straining or breaking other parts. The knife-bar is provided with an adjustable friction roller at each end, directly behind the knife-bar, to steady the bar.

It sometimes happens that large shears, especially those having heavy fly-wheels running at high speed, cause trouble by one end breaking and before the shear can stop, will seriously strain pins and break other parts at the opposite end, as an automatic machine can not stop until the knife-bar has returned. Invariably the second break thus occurring is worse than the first. This difficulty has been overcome. The patent shearing table adjustment is composed of the usual set screw that pushes the table toward the top blade, and a bolt which draws the table away from the top blade, thus making it convenient to adjust the shearing table, forward or backward, without hammering. When both are tightened, a complete lock is formed, holding all parts rigid.

The automatic hold-down is ¼ inch near the blades and will elevate 3 to 3½ inches. It is quick to release the sheet when the cut is completed. There are large openings at different points, as well as at the ends to admit light, so that the shear line may be seen when the hold-down is down. Adjusting swivels are provided with a sprocket wheel and a link belt chain, to adjust both ends of the hold-down accurately at one time, for cutting different thicknesses of plates.

The automatic clutch is composed of a strong four-jawed clutch, with steel faces. It will put the shear in motion quickly after depressing the treadle, and allow the shear to stop when the blade is up. By keeping the treadle down, the shear will run on continuously.

The extension drop leaf-tables have an extra parallel trimming gauge, for continuous cutting and slitting and trimming long sheets. This gauge is placed on the table at the first cutting end of the blades so as to guide the sheets as they are fed through the throat of the shear.

The patent center bearings are composed of two extra adjustable wedge-shaped bearing supports attached directly behind the knife-bar, to prevent it from springing, and increase the strength of the shear, as these extra bearings are attached to a large angle-shaped cross-tie, or beam, properly fitted and bolted to the inside of the housings, which is provided with aheavy truss rod, with an adjusting post, or screw jack in the center. The 8 and 10-foot shears are provided with patent center bearings, which are conveniently adjusted accurately by one screw. The shear has front and back gauges and squaring gauges. Two sets of open end brackets are furnished for the rear side to attach the back cross-gauge. A long set of brackets is attached to the rear of the table, and a short set to the rear side of the knife-bar. Both sets can be attached at one time and not interfere with each other.

A NEW WORK FOR FOUNDRYMEN.

METALLURGY OF CAST IRON.—An Exposition of the Processes Involved in the Treatment of Cast Iron, Chemically and Physically, from the Blast Furnace through the Foundry, to the Testing Machine. By Thomas D. West. With illustrations. Pp., 573. Price $3. Cleveland, O: The Cleveland Printing & Publishing Co. 1897.

In this his latest work Mr. West presents some of the fruits of the revival of interest in foundry metallurgy. For it has been on its metallurgical side more than on its mechanical side that foundry practice has been most prolific in literature and experimental work in the past few years. Five years of foundrymen's associations, of quickened interest in physical and chemical tests as aids to greater certainty and uniformity in results, and of discussions that have brought foundry chemists and foundry engineers to the front, have opened up fields little worked theretofore. Mr. West's two books on foundry practice published respectively 12 and 15 years ago, came before this chemical and metallurgical movement; and they had to do largely with cupola practice and with the preparation of the mold. Popular as they still are among foundrymen, they are now supplemented by this work, more pretentious than either, and covering a field in which the most noteworthy advances in foundry achievement are to be made, in the next ten years.

Mr. West's experience has been enlarged and ripened since his first contributions to foundry literature. He has been a hard student, and what he has brought forth has been the product of the intensest effort, spurred by rare enthusiasm and an ambition to add to the sum of information concerning his chosen work. In the past five years, with his foundry located so close to blast furnaces that the taking of molten metal direct was a possibility, he has availed himself of the opportunity to study furnace practice with special reference to the conditions there which give the metalloids their characteristic influence upon cast iron. If tireless research and infinite pains can earn such a title, Mr. West certainly has earned the right to speak with some degree of assurance concerning cast iron. True, knowledge on this subject is yet meager and unsatisfactory; it lacks the essentials of science. But those who have pioneered are entitled to all credit for what they have contributed to the common store. Already they have helped to make plain many things that the foundry world has long been content to consign to mystery.

There are four distinct departments in Mr. West's new book. The first discusses iron making, and in carrying out the author's idea of giving foundrymen some insight into the original sources of the problems connected with the metalloids, gives a brief chapter on coke and another on ore. Furnace methods receive considerable attention and, in passing, some things are emphasized that might be successfully applied to cupola practice. The second part is devoted to the more recent advances in cupola practice. Methods for the application of "center blast" are presented in detail, and the cupola chapters of the author's previous works are brought down to date. The third and fourth parts comprise the bulk of the work. Part 3 is perhaps most important of all. It gives some results of the advance movement of the past few years for the application of chemistry to foundry operations. The sub-topics include chemical and physical properties of cast iron, constant and changeable metalloids and regulation of mixtures, fracture and face as an index of composition and strength, purchasing of iron by analysis, the basis of grading, segregation at furnace and foundry, chemical composition and strength of typical foundry mixtures, etc. Part 3 abounds in information of value on that most important of foundry problems, the mixing and melting of iron. The fourth part of the volume is devoted to the subject of testing and in addition to some of the papers on this subject which Mr. West has presented before the various technical societies, it embodies some new data bearing on the causes of erratic results in transverse and tensile tests, contraction chill, etc.

The last chapter, under the caption, "One Hundred Items to be Remembered in Making, Mixing, Melting and Testing Iron," is the concentration of a vast amount of experience in the lines mentioned, and is one of the most valuable features of the work. Some of the paragraphs under the sub-head "Mixing and Melting Iron" are the corollaries of years of demonstration. Put in this terse form, some of them stand without the modifications that more elaborate statement would introduce, and each must be taken in its relation to the others that its consistency may appear.

The illustrations of the work are abundant, and in typography and general appearance it is highly creditable. It may well be regarded as a noteworthy contribution to the literature of cast iron, and well deserving a wide and appreciative reading.

NEW TIN PLATE ASSOCIATION.

An important meeting of tin plate manufacturers was held on Saturday, Feb. 20, at the Monongahela House, Pittsburg. The meeting was called at the request of the two seceding interests and was stated to be for the purpose of forming a new organization on a more economical basis than that of the Tinned Plate Manufacturers' Association, which has existed in its present form since 1891. It was affirmed that the contracted margins had by tin plate manufacturers were out of proportion to the expense incurred in securing the benefits of the association, and it was believed the same results were obtainable at a less outlay of money. The temporary meeting was presided over by George A. Laughlin, of the Irondale Steel & Iron Co., and C. R. Britton, of the Britton Rolling Mill Co., Cleveland, acted as secretary. Twenty-one companies were represented having a total of 127 active mills.

A committee of six was appointed which will submit at a meeting called for April 6 a plan of reorganization. Ninety per cent of the active mills will be necessary to ratify the proposed agreement. Pending the committee report on organization a temporary agreement was made which likewise becomes effective when signed by 90 per cent of the active mills. Under the temporary arrangement extras for odd sizes are to be 10 cents per box in lots of 50 or less and extra charges optional on larger lots, thus protecting well the larger interests. Extras for crosses in cokes were reduced from 70 cents to 60 cents per box, at mill, for IX, and 60 cents for each additional cross. Officers were elected as follows: President, D. G. Reed, American Tin Plate Co., Elwood, Ind.; vice-president, Warner Arms, Falcon Sheet & Tin Plate Co., Niles, O.; temporary secretary, James Bray, Beaver Tin Plate Co., Lisbon, O. The secretary of the first meeting, Mr. Britton, is authorized to secure signatures to the new agreement and report at the meeting called for April 6. The affairs of the present Tinned Plate Manufacturers' Association close their fiscal year on June 1, and meanwhile the affairs of the old association will continue as usual. The following mills were represented at the initial meeting: Pennsylvania Tin Plate Co., Monongahela Tin Plate Co., Morton Tin Plate Co., La Belle Iron Works, the Morewood Co., Atlanta Tin Plate Co., Wallace Banfield & Co., Pittsburg Tin Plate Co., Ellwood City Tin Plate Co., United States Iron & Tin Plate Mfg. Co, Cumberland Steel & Tin Plate Co., Falcon Sheet & Tin Plate Co., Irondale Steel & Iron Co., Britton Rolling Mill Co., American Tin Plate Co., International Tin Plate Co., Beaver Tin Plate Co.

Lake Superior Iron Mines.

In connection with the dismissal of the Merritt-Rockefeller suit, growing out of the formation of the Lake Superior Consolidated Iron Mines, a document was filed in the court, signed by all the Merritts, which sets forth that from recent independent investigations they have become satisfied that no misrepresentation was made or fraud committed by Mr. Rockefeller or by his agents.

Messrs. Foote and Miller, of the Illinois Steel Co., have been at the Mesabi range in the past 10 days inspecting a number of properties. Mines in the vicinity of Virginia and Eveleth were visited, and naturally the trip is regarded with interest in connection with reports of negotiations by the Illinois Steel Co. for the acquisition of mining property in Minnesota. Vermilion range mines are also being inspected, and rumors are revived of negotiations for the purchase of a mine on this range.

The Franklin mining properties at Virginia closed down last week, throwing 150 men idle. Little mining had been done in the winter, dead work being taken care of.

Reductions have been made in the working force at the Fayal mine.

The Germania mine near Hurley, Wis., has closed down. About 40 men had been employed. The company did not feel warranted in making the expenditure for retimbering that would have been necessary had work gone on.

Wage readjustments are imminent at a number of Marquette range mines. The scale at Ishpeming properties is above that paid on the Gogebic and Menominee ranges, with the recent reductions at mines on the latter, and it is expected that a new scale will soon be announced that will put the Marquette range on a working parity with its competitors.

VARIATIONS IN THE METALLOIDS.

TO THE EDITOR:

The questions raised by Messrs. West and Johnson in regard to the variations of the metalloids in pig iron are extremely important and far-reaching. I have had a great deal to do with such matters during the last few years, as consulting chemist for a large iron company in the South, and would be glad to add my mite to the general discussion. It seems to me that we have to discriminate between variations of composition that are not harmful, i. e., for foundry purposes, and may therefore be disregarded, and such as are positively injurious to the metal, and should therefore be controlled. But here is the rub! What are to be classed under the former, and what under the latter head? This is not so easy to answer.

It carries us at once into the heart of a conflict that is still raging, and compels us to take sides and help out our friends. Looking at the matter from the standpoint of the foundryman, it would appear that he would be entirely right in demanding that the iron purchased as No. 3 F. should conform to a certain limit of composition. It is well understood that even the best No. 3 F. is subject to variations in composition, which, while annoying to the conscientious furnace manager, do not seriously impair the quality of the iron. Once having agreed upon the limit of these variations, it is not difficult to grade the iron accordingly, and almost any well managed company will sell iron with this understanding.

As to the control of the various metalloids in the furnace, this is another and a totally different question. It concerns itself exclusively with furnace practice, and does not enter into the sale of iron on analysis at all, except in so far as it may cause the rejection of certain casts. Even with the extremely variable nature of Southern ores, it has been found entirely feasible to guarantee the silicon below 1 per cent and the sulphur below 0.050, for basic iron. It is comparatively easy to control both silicon and sulphur, and for basic iron this is enough, provided that the phosphorus does not exceed 1 per cent. I say this is enough for basic iron, for the two carbons cut no great figure, and manganese varies so little that it may be neglected.

The basic iron consumers have been wiser in their day than the foundrymen, the mill men, and the pipe men. They have ascertained what kind of stock they need and must have, and they buy that and nothing else, holding the producers to rigid specifications. The maximum amount is the true basis of sales, i.e., the silicon, and sulphur, and what-not must not exceed a certain specified percentage. If the percentages are below this figure, so much the better. There is no reason why all kinds of iron should not be sold on the same principle, with this addition necessary, of course, for general work, that the silicon, for instance, shall not fall below a certain amount.

Mr. West's contention that "silicon and sulphur are chiefly responsible for changes in the grade of iron coming from similar ores, fluxes and fuel," is certainly correct as far as it goes. But it does not go far enough. My own researches into the matter, unfortunately limited, have convinced me that in combined carbon we have an element of great variableness, and possible harm.

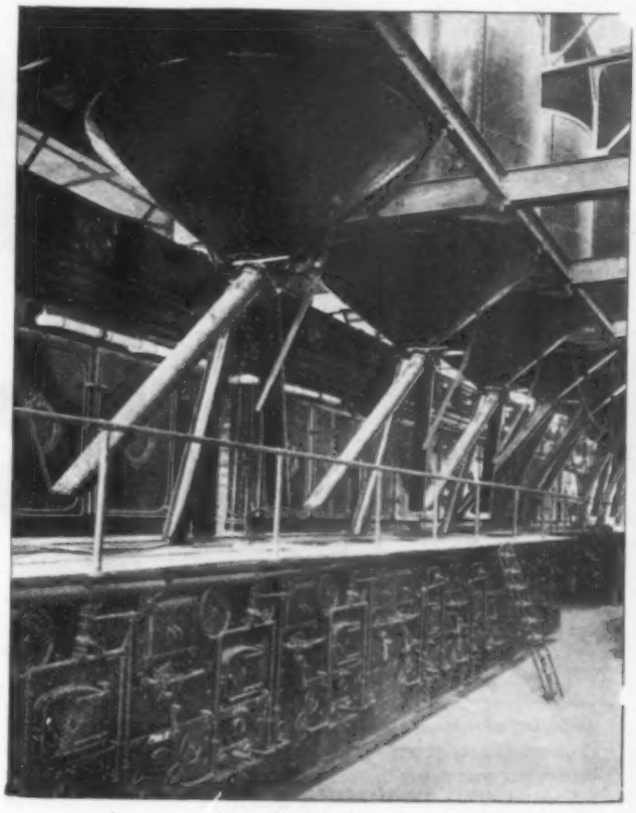
When an iron, for instance, that shows the color, fracture, strength, granulation and face of a No. 3 F., and which would be classed by almost any grader on the yard as No. 3 F., shows on analysis over 3 per cent of silicon, the trouble is apt to be in the combined carbon. Any system of grading ordinary irons on analysis that does not consider the combined carbon is apt to lead the chemist into serious error. With Northern furnaces that buy large stocks of ore the variation in the composition of the ordinary grades of iron may not be so noticeable. But with stock varying from day to day, sometimes compelling half a dozen changes of burden in 24 hours, it is quite otherwise. For making foundry irons it is necessary that sufficient time be allowed the iron in the furnace to charge itself with graphitic carbon. If this be not done, the iron may resemble, we will say, a No. 3 F., but in reality it will be a No. 2 S. or a No. 1 S., so far as the silicon is concerned, but a gray forge, or mottled so far as concerns the combined carbon. In other words, we have an iron carrying over 3 per cent of silicon and over 0.75 combined carbon. It does not seem to me that iron can be correctly graded by estimating the silicon and the sulphur alone. Something more is needed, and this something is an estimation of combined carbon. "But," says an objector, "you introduce another element of confusion, and the yard grader, often at his wits' end now, will become a hopeless imbecile." Not so, my friend. I propose to clarify a very muddy matter, and to put the grading of iron where it belongs—in the laboratory. There are complaints of this shipment and that shipment. Iron that was bought as 3 F., being graded on the yard, is not really 3 F. but is a soft iron, etc., etc. If the only scientific system, viz., that by analysis, were adopted, we would hear less about variations of composition, for the purchaser would know what he was buying, and the seller would know what he was vending.

WM. B. PHILLIPS.

Birmingham, Ala., March 1.

COAL AND ASH HANDLING EQUIPMENT.

The handling of coal and ashes by mechanical means is coming to be a feature of all well-designed boiler houses. The power station not so equipped has the drawbacks of dirtiness and a considerable item in the expense account for shoveling coal and carrying away ashes. In the Hawthorne avenue power house of the North Chicago Street Railway Co., Chicago (of which a portion of the boiler room is shown herewith), the coal is delivered by wagons to coal storage space beneath the sidewalk. Thence it is drawn as needed into a conveyor discharging into an elevator at the end of the room. The elevator, in turn, delivers the coal into a horizontal con-



veyor running over the cylindrical coal tanks shown in the cut. Each of the ten tanks holds 25 tons, and the capacity of the machinery is 40 tons of nut coal an hour. The ashes are drawn through discharge gates, from hoppers in the basement under the boiler, into a tilting car, and run over a track to either end of the room. Link-belt elevators raise the loaded cars to storage pockets at ends of building, whence the ashes are drawn finally to wagon or scow and carried away.

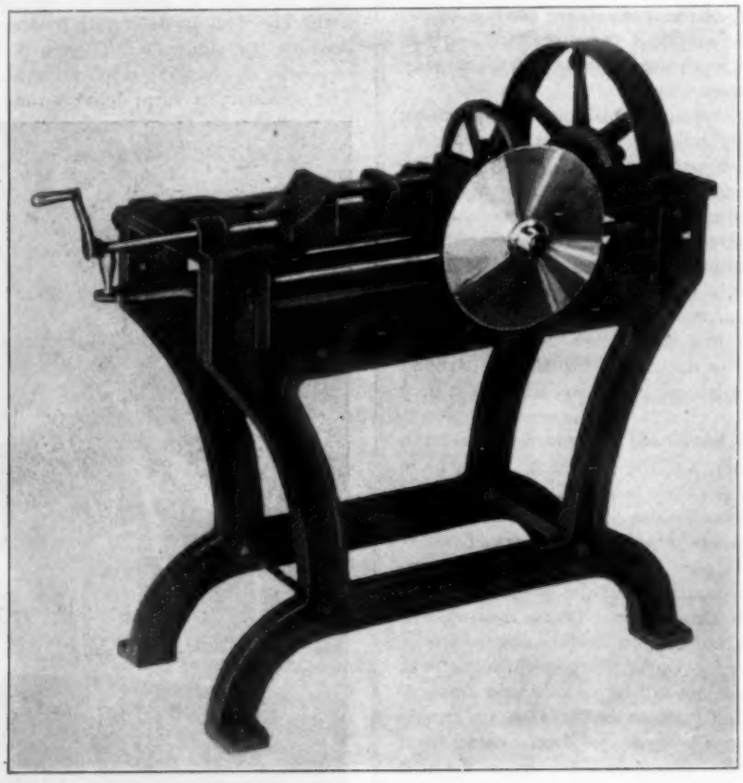
The handling and conveying machinery was designed and installed by the Link-Belt Machinery Co., of Chicago, whose specialties include also devices for the rapid and economical handling of all classes of freight, grain, raw and manufactured products, and for the transmission of power.

THE Holland Company, Pittsburg, will handle the output of girder rails from the South Sharon Steel Co., Ltd. The old Wheatland mill having been equipped for rolling girder rails, the new company announce that April deliveries will be made.

CIRCULAR SHOP SAW.

The machine illustrated is manufactured by the Q. & C. Co., Chicago, and is designed for general shop use. It is equipped with gearing to reduce the speed of the saw from 150 to 15 per minute. The fast speed is used for cutting brass, tubing, pipe and gates from brass castings. For this purpose it is equipped with a lever feed which moves the saw forward as rapidly as it will cut. When steel or iron are to be cut the reducing gears are thrown in, lowering the speed to 15 revolutions per minute, and the saw blade is then run in an oil tank which is attached to the carriage and travels with it. The saw blades can be worn down nearly their entire diameter, and each machine is furnished with a suitable saw sharpener. The saw, when not forced, will give a true cut.

The feeding mechanism is simple and positive, and is quickly adjustable, when the machine is running, from slowest to fastest. The operation of the machine is simple and an apprentice can be trusted with its operation. It is sold complete with one 10-inch saw blade and saw sharpener. The details of the machine are as follows: Weight, 300 lbs.; floor space, 30 x 15 inches; speed of driving-pulley, 150 rev. per minute; diameter of saw, 10 inches; thickness, $\frac{1}{16}$ inch, or 16 gauge; extreme capacity, 12 x 3 inch solids; feeding speed, $\frac{1}{8}$ to 2 inches per minute.



CIRCULAR SHOP SAW.

This saw has been brought out by the manufacturers in response to a demand for a saw for general shop use, which could be speeded high for soft metals but at the same time would be adapted to the sawing of harder metals, in which service a fast feed would be impossible.

CONNELLSVILLE coke production has been increasing of late. The figures of the *Courier* for the week ending Feb. 20 show a total of 105,878 tons, a gain of over 5,000 tons as compared with the preceding week. The month of February brought the number of active ovens above the 10,000 mark for the first time in a year. Of the 11,437 ovens controlled by the H. C. Frick Coke Co., 6,023 were active in the week above referred to. Of the 17,989 ovens in the region, 10,352 were active.

THE American Pig Iron Storage Warrant Co. had in its yards Feb. 28, 212,500 tons of pig iron, 1,400 tons having been put in yard and 100 tons withdrawn in the preceding eight days.

CONTRACT AND OTHER SYSTEMS IN SHOPS.

The following is taken from the latest of Henry Roland's articles on "Successful Shop Management," appearing in the current issue of the *Engineering Magazine:*

No more instructive example of the successive employment of day-rate, contract, and piece-rate workers can be found than that given by the labor management of the Singer Sewing Mfg. Co., which has been in operation well towards fifty years, and has over 10,000 shop employees, all under the same management, precise information as to the policy of this establishment since 1863 being available. The Singer Company had one strike in the New York shops at the time the eight-hour day was legalized; the strike was for an eight-hour day with ten hours' pay, and entailed a shut-down for five weeks, at the end of which the men came back to the regular ten-hour day, which has held ever since. The Singer Company had, in 1863, about 700 men at their only shop, located in Mott street, New York City, had no milling machines and no gang drillers, and was doing its work on lathes and planers. The parts did not "gage" at all; assembling was very expensive; and, after a machine was adjusted and in sewing order, all of the parts were kept by themselves while the frame was being japanned, and afterwards put back on the same frame, as they were very far from interchangeable. The pay at that time was principally by the day. In 1863, the Singer Company put in its first ten milling machines, made by the Manhattan Fir Arms Co., at its Newark shops, on a modified Lincoln pattern. Following the success of these machines, many others were immediately introduced, gang drills and screw machines were brought in, and the whole place was brought up rapidly to the armory plant standard. With these improved tools, necessitating skilled or specialized laborers, instead of machinists, contracting came in, and day-pay went out. The contract system, with day-pay operatives under the contractors, became general in 1866–7, and held its own about 15 years, until 1883, when it was finally dropped in favor of fixed day-pay foremen and piece-rate workmen, which system is now in exclusive use at both the Elizabethport and the Glasgow factories.

At first each contractor hired, paid and discharged his own men; with them the company had no dealings whatever, exercising over them only general authority in the matter of shop regulations. These contractors were entirely in control of the work. They received with the contract small tools

enough to equip the machine tools in their own departments, but the use of these small tools was optional with them; each contractor kept up his own tools, and, if he desired improvements in the tools, made them himself with his own tool-makers, of which each contractor kept a larger or smaller force at his own expense. It will be seen that, with this order of things, the management could be kept in almost total ignorance of the real course of affairs in any contractor's department, and, in point of fact, was kept in ignorance so far as the contractors could avoid giving information. Contractor's rates were made to hold from January 1 to December 31, and were reduced to what the management guessed was about the actual cost to the contractor. The result of all this was that, while some of the very small contractors made as little as $2,000 per year, some of the larger ones, running two hundred or more men each, made more than $10,000 a year, and these earnings (in all cases vastly more than they could have obtained elsewhere for their services) did not vary much from year to year in spite of the annual reduction in prices paid by the company. January 1, each contractor put his tool-makers at work and kept them busy until he saw the way clear to his usual earning for the twelve-month; then he confined his labors to thinking for the remainder of the unexpired contract time. This process was easier than at first sight it appears. With two hundred men a contractor had only to make each man turn out fifty dollars' worth more work in the year than he produced the year before to make up his profit of $10,000, which the company found itself powerless to diminish. Say with two thousand workmen the contractors, great and small, might divide $100,000, or $125,000, among themselves, while at a day rate these same contractors could not have obtained more than $30,000 or $40,000, thus making the company pay a very large sum above what it believed the actual value of the contractor's services to be. This led very naturally to a close scrutiny of the situation, and resulted, first, in the payment of the contractor's men by the company directly. This looked like a very innocent and unimportant change, but it was really the thin end of the wedge which was ultimately to deprive the contractor of his profits. As soon as the company paid the workmen, it had correct information as to the piece-cost of the work, and could also, of course, discover which pieces were high and which low in price, in view of the labor-time consumed in production. Hence the company became able to approximate more closely to the contractor's possibilities of cost-reduction for the next year, and so could more intelligently "adjust" or reduce the prices offered in the annual contract. Yet this made little difference, on the whole, in the gains of the contractors. It was true that the price of work was annually reduced, and that the quality of the work steadily improved, but the company did not view the great gains of the contractors with any approach to satisfaction, and finally, about 1883, the whole contract system was abrogated, and the policy of fixed-pay foremen and piece-rate workers was substituted without the slightest difficulty, the old contractors, without exception, remaining as foremen, though under greatly reduced pay, even very generous foreman's wages being far below the great sums obtained yearly by the same men in their previous positions.

Some of the worst features of contracting, especially the sub-contractor extortion, had been previously eliminated. By the sub-contractor system the principal contractor became almost an idler, drawing a large sum of money for merely nominal service. The sub-contractors drew large pay and were directly interested in continuing the system, which virtually made the company pay two large profits to its own workmen for its own work done in its own shop on its own tools, all paid with its own money. But the sub-contractor system was not very long endured after its full scope and purport became apparent. It is not obvious at first sight that the company could be a loser by the sub-contract system. It seems that, having agreed upon a certain price for a certain number of certain pieces of work, it had put the matter in final form, and that the sub-contractor was a matter of interest to the principal contractor only. But the sub-contractor extended the principle of efficiency brought into play by the contract system itself, which is the certainty that constant, minute, and highly-interested scouting directed upon any article of manufacture by specially-trained intelligence will always result in a reduction of cost. Hence the more contractors, the more minute the sub-divisions of the narrow field of observation, and the more improvements devised and retained until after the signing of the yearly contract for development, to bring the new year's profits under the reduced scale up to the previous year's standard. It is clearly seen in this light how the specious claims of the contract system to economy could remain so long unconfuted. The advocate of the contract system truthfully asserted that the constant close attention of the contractor made work cheaper than it would be made under the mere general observation of any superintendent, no matter how able, and that, since the high pay of the contractor was coupled with a low piece-rate to the company, the contractor's large profit was simply good money well paid to a good and profitable servant.

The true answer to the foregoing is fully given by the experience of the Singer Company, which is especially valuable because it has embraced a large number of operatives, and has extended over a long period, and hence is removed from the possibilities of special premises or developments which might cause results from smaller or less extended application of its methods to be regarded as but doubtfully conclusive.

This experience shows that, with fixed-pay foremen, the cost-reduction is fully as constant and rapid as it was under the contract system, and this saving comes sooner to the owners. Suppose a contractor, having already in view sufficient improvements to make his profit for a certain year, should in January devise a further improvement; he would then hold that until after the next contract was made, and it would be almost two years from the time the contractor knew of the possible gain before the owners begin to benefit by it. As things now are, as soon as an employe devises an improvement in manufacture, he brings it to the management and it can be used at once, instead of the owners having to wait for the knowledge of it until it becomes needful to the foreman's interest to use it. Experience has shown that, with a wise and liberal policy pervading the establishment, and with a good system of accounts, the heads of departments will have sufficient ambition to make a good showing, and so friendly a rivalry will exist between departments worked on the piece-work system as to effect a satisfactory economy, while preserving a better feeling among the employees than is secured by any other method.

The pay of the operatives under the piece-rate is better than it was under the day-rate, and is not reduced by a reduction in rates resulting from improvement in methods or tools.

Whether the same causes which make the contract system unsatisfactory to the machine shops will finally result in banishing the "scale" and the "boss roller" system from the rolling mills or no cannot now be predicted. The laws of contract labor cannot vary in their results; yet it may be a long time before fixed-pay bosses and piece-paid workers come into the rolling mills, and it may even be a long time before all the contractors disappear from the New England shops.

There are abundant anomalous conditions in actual labor employment in the United States, and the discrepancies may continue for a long time, although one of them, the high machine labor prices in the vicinity of Cleveland, Ohio, seems in a way to regulate itself, as it is reported that the Brush Electric will remove from Cleveland to Lynn, Mass., and that the Lozier cycle factory will go from Toledo to some point east of New York, to escape the exactions of thoroughly-organized labor, which make machine production more expensive in that region than elsewhere.

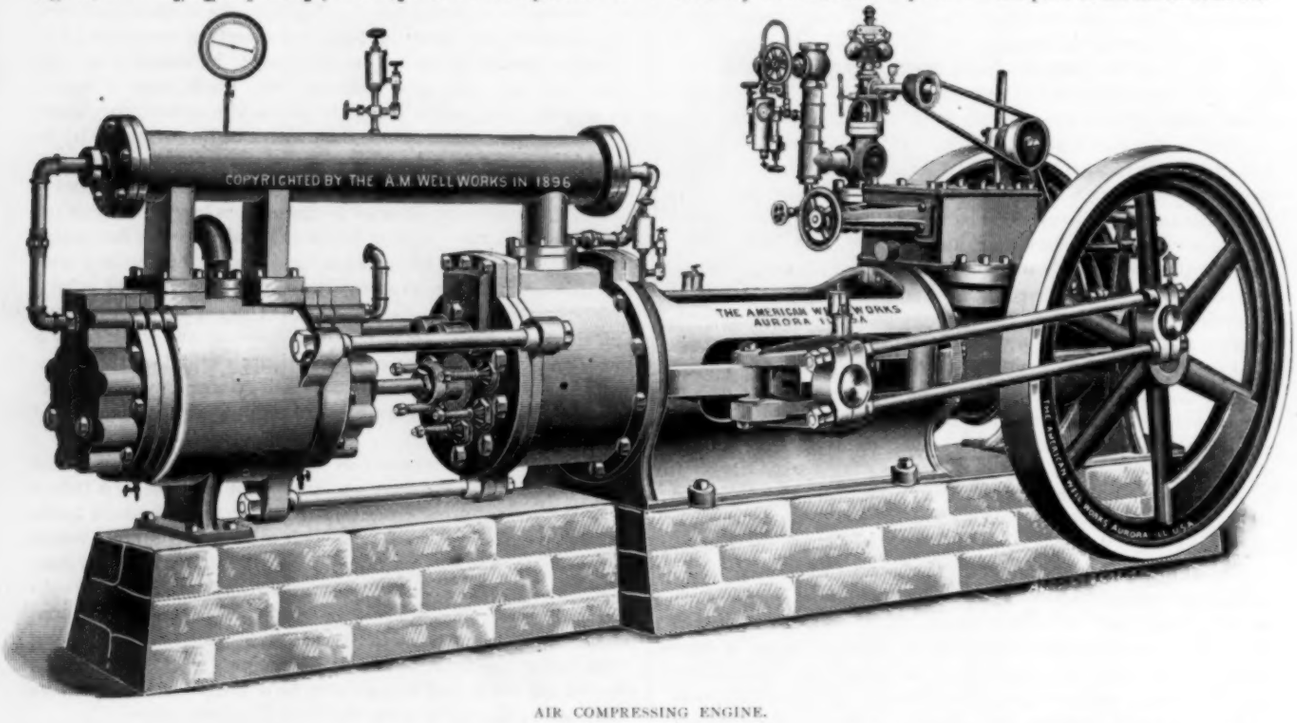
One thing seems certain, however,—the gradual extinction of the contract system and its replacement by fixed-pay foremen controlling piece-rate workmen.

THE announcement for the 60th meeting of the Foundry men's Association, Wednesday evening, March 3, stated that it would be held at the Philadelphia Commercial Museum, 243 S. Fourth st., Philadelphia—the building formerly occupied by the Pennsylvania Co.'s offices. The programme for the evening included an address by Prof. W. P. Wilson, of the Museum, a paper by Guy R. Johnson, of Embreville, Tenn., on "Embreville Iron," and the reports of the executive committee and other committees of the association.

AIR COMPRESSING ENGINE.

A type of double compression compound air engines, for compressing air for raising water is shown in the cut. The engine is manufactured by the American Well Works, of Aurora, Ill., and while primarily designed for service in connection with artesian wells it is adapted to any use in which high-pressure air is required.

This engine is provided with an adjustable steam cut-off for adjusting the slide valve to shut off steam supply at any point in its stroke, to obtain the benefit of the expansion of steam, and economize in operating expense. The balance wheels are large and heavy for conveying the accumulative tangential power in balance wheels to the pistons when the greatest force is required, and steam pressure the least, at the moment the highest compression takes place, allowing the engine to maintain a uniform motion. The manufacturers have overcome the great force necessary for compressing air at extreme ends of the large air cylinder by forcing it into the small cylinder when the piston recedes, and makes space to receive air from the large cylinder. The air in the large cylinder is compressed to one-fourth its natural volume (45 lbs.) It is cooled in its passage to the small cylinder and compressed the second time. The steam has a fourfold advantage of the air in the small cylinder, and is recompressed to



AIR COMPRESSING ENGINE.

160 lbs. more easily than it could be to 80 lbs. by a single compression engine. A more uniform pressure can be maintained by the use of the double compression than by the single, and by its operation it is possible to lift water economically out of wells, the natural level of which is several hundred feet below the surface, and deliver it in elevated tanks or reservoirs at a distance.

RADICAL ACTION ON ARMOR PLATE PRICES.

The armor plate issue has been almost as important a feature of Congressional proceedings of late as during the famous investigation of 1894. The House adopted last week the report of its Committee on Naval Affairs appropriating a lump sum of $3,210,000 for armor plate for the three vessels for which armor plate has not yet been purchased. This appropriation is based on a figure of $400 a ton. The Senate proceedings of Monday night on the naval bill before that body were marked by another of the vicious tirades of Senator Tillman. The discussion showed, moreover, that there was a strong sentiment in favor of the amendment of Senator Chandler fixing a maximum price of $300 for armor plate. Mr. Chandler's outbreaks have been so numerous in the past two years that his performances have ceased to impress conservative men. He has satisfied himself, by a process that has no regard for the economics of the case, but simply responds to the prejudiced notion that present rates must practically be cut in two, that $300 is an amply profitable price for armor plate. By a vote of 36 to 12, he got this price incorporated in the Senate bill in place of the $400 figure presented by the committee. The bill then went to the House, where it was referred to conference. The result is expected to be an utter refusal to accept the Senate price.

In the Senate debate, Mr. Chandler commented on the offer of the Illinois Steel Co. to furnish armor at from $200 to $250 a ton, and on the fact that the Bethlehem company has furnished the Russian Government armor at $240. When Mr. Quay remarked that the Illinois Steel Co. had made no direct proposition, Mr. Chandler said he took it the Senator meant to imply that the Illinois company was merely seeking to annoy and embarrass the Carnegie and Bethlehem companies.

The Carnegie Steel Co. and the Bethlehem Iron Co., it is quite well understood, will refuse to furnish any armor plate on the $300 basis, and the result of the Tillman-Chandler attack may be either that no armor plate can be secured for the warships now under way, or that the Illinois Steel Co. proposal may be taken more seriously by the Government than was at first thought probable. The whole performance has shown a hostility to industrial capital on the part of an influential element in Congress, that threatens further radical steps. It seems impossible, especially in the Senate, to secure any action affecting manufacturing interests, that does not bring to the front a fierce onslaught on men who have invested largely in interests that are immensely beneficial to labor and to the community at large.

LATER.—After a long conference the House committee agreed to the Senate armor plate amendments, Wednesday, except the one fixing $300 as a maximum price. Late Wednesday night this also was agreed to and the naval appropriation bill passed both branches.

THERE is trouble between the Globe Iron Works Co., Cleveland, and its men. Work is now almost suspended at the shipyards, in consequence. The difference started over a question of pay for work done on Saturday afternoons. The entire scale then came up and the men demanded a minimum of $1.50 a day, also that only union men be employed. This was refused and a strike followed. The company refuses to discharge its non-union men and says it will fill up its works with outside men. A long strike is probable. About 700 men are now out, including those who cannot work because their employment depends on the operation of other departments.

DOUBLE-SPINDLE ENGINE LATHE.

The machine shown in the illustration is the solution offered by Dietz, Schumacher & Boye, of Cincinnati, of the problem presented by a machine shop three-fourths of whose work can be done on a 26-inch lathe, but that occasionally has a job of boring or turning requiring more swing in order to handle it. "Raising blocks" for head and tail stock, the usual recourse in such cases, require time to put them in and usually make trouble with the feeding arrangements, a lathe once raised spoiling the alignment in both directions. As it appears from the front view given, the lathe is adapted for use on smaller work and is no different from the regular 26-inch lathe of the same make, except that the tail stock is somewhat heavier. It is handled as the regular 26-inch lathe. The intermediate gear is connected with a lever as shown, and is disengaged with the pinion by raising the lever up so that the supplementary spindle can remain at rest.

When larger work is to be handled the gears are connected up by pressing the lever down and putting a suitable face plate or chuck on the upper spindle and placing the work on the upper pair of centers. An extra tool post is provided for bringing the tool up level with the center if this is desired. Some of the advantages of this lathe in practice are: The upper spindle makes one revolution to two of the lower, consequently it is twice as powerful as the lower. The machine will cut double the amount of threads of a single lathe, i. e., a thread 4 to the inch may be cut on the lower spindle and the same setting of gears will cut a thread 2 to the inch on the upper spindle. The feed mechanism will also double itself, i. e., if the feed on the lower spindle is 60 to the inch, it will be 30 to the inch on the upper. The machine can be changed from the 26 to 44 instantly, which is done in about the same manner as the back gear is thrown in. All that is required is to insert the intermediate gear by pressing lever down.

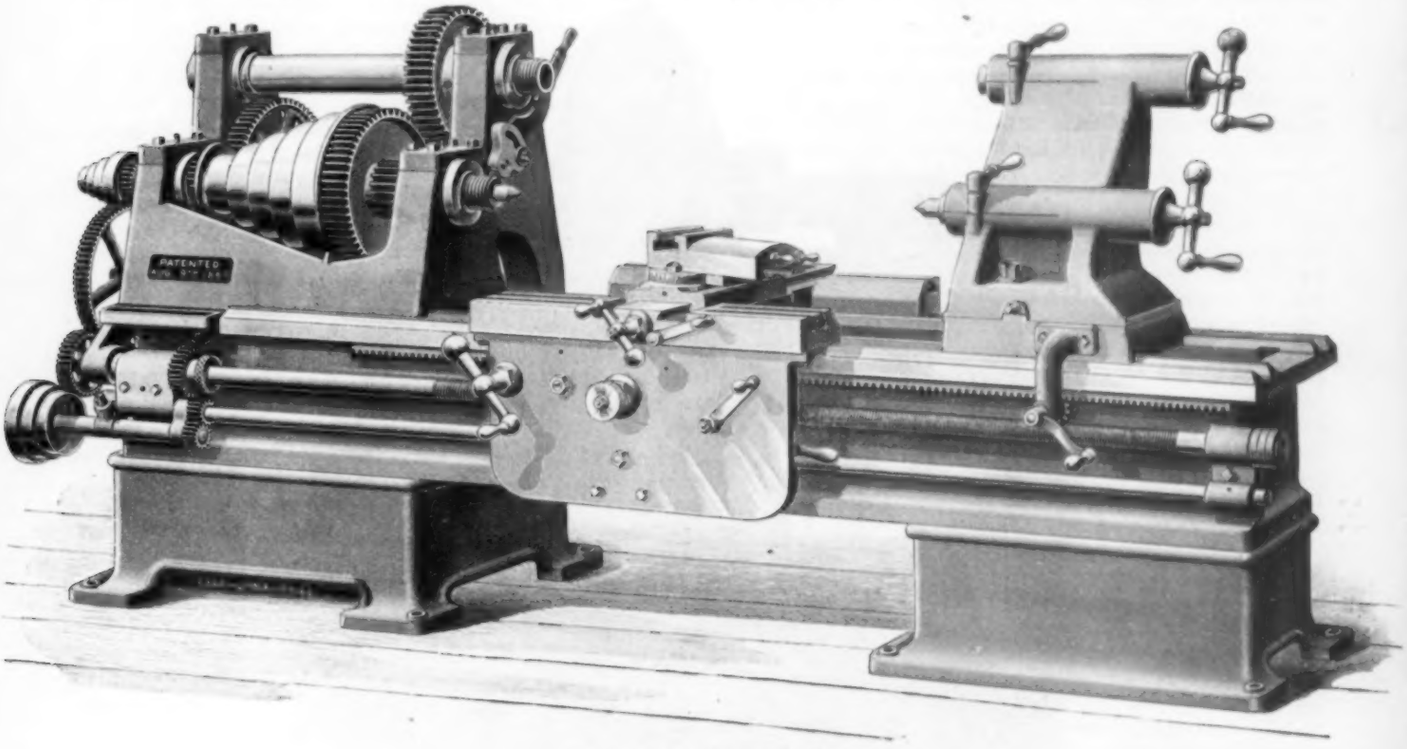
Two sizes are made, namely 24-40 and 26-44. The 26-44 is of the same dimensions and sizes of the 26-inch lathe of the same manufacturers, the features of which are indicated below:

The reverse movement for carrying the feed in either direction is in the apron, and when the feed is engaged mechanism has been provided so that the half nuts cannot be engaged until the feed is disengaged. It is impossible also to engage the feed while the machine is cutting screws. An eccentric clamp is also provided, as shown at the right of the cross-feed crank. By moving the crank downward it locks the carriage firmly while the cross-feed is at work.

A change of feed may be had, apart from the three-step cone, by gearing, in connection with the feed cone, so that either very fine or very coarse feeds may be obtained independently of the lead screw. The bracket to which these gears are fitted swivels on a pivot to which it may be tightened, the adjustment being such as to keep the feed-belt just sufficiently tight to carry the feed properly.

The head stock is very massive, and is fitted with bronze bearings. The spindle is extra large, of best crucible steel, with hole of 2¼ inches through the center. The cone has five steps for 3¼-inch belt, and is powerfully back-geared. The carriage is of greater length and depth than usual, being carried a little above the V's upon which the tool block moves, in order that the "T" seats may be of extraordinary strength. The tail stock is heavier than usual and is fitted with a spindle for long travel, and provided with a tightener for taking up wear. The cross feed is engaged by pulling a button forward one inch, and disengaged by pushing back one inch. The bed is of great depth and of extraordinary weight. The apron is grooved into the carriage, making a solid fit without screws.

The front bearings of the lathe are 4⅛ inches diameter and 7 inches long; the back bearings 3⅛ inches and 5⅛ inches; the nose on the spindle, 3¼ inches diameter and the hole in the spindle, 2⅛ inches diameter. The swing over the ways is



DOUBLE-SPINDLE ENGINE LATHE.

26½ inches; over the carriage, 16 inches. The distance between centers is 3 feet of an 8-foot bed. The cone has five steps for 3½-inch belt, ranging from 16-inch down to 7-inch. The lathe will cut threads from 1 to 13 inclusive, including 11½-inch pipe thread.

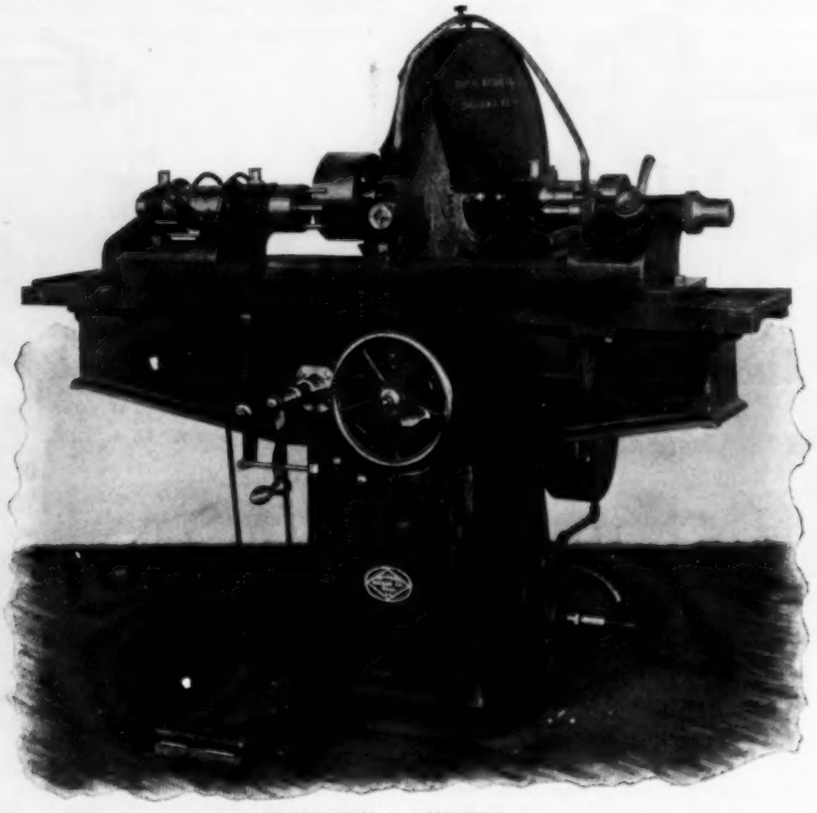
A VERY considerable revival in railway building is now in sight. Since the first of the year the *Railway Age* has been notified of a considerable number of new undertakings which promise to begin work soon; while a still larger number of enterprises carried over from previous years and on some of which work has already been done, appear now to have secured the means for going on. Thousands of miles of lines can be enumerated for which room and need seem apparent on an intelligent study of the situation, and whose construction therefore is merely a question of better times. For a few of these contracts have already been let, while the promoters of others are sanguine that they will get under way this year. Besides the legitimate enterprises there are various paper schemes, such as that of a new transcontinental line, which have little likelihood of accomplishment; but altogether there is already a better outlook for railway building than has been observed for several previous years.—[Railway Age.

SPINDLE GRINDING MACHINE.

Nearly all taper spindles used in spinning frames have been ground on a cumbersome machine, generally made with a wood frame and using a grindstone from four to six feet in diameter and from three to four inches on the face. The machine shown herewith is designed to do the same class of work by using an emery wheel 26 inches in diameter, 1½-inch face, while the entire machine is compact and of extremely solid construction. In order to obtain the necessary taper to the spindles the upper table of the machine is provided with a swivel motion, being pivoted in the center with graduation at the end of the table similar to those on a universal grinder.

The spindle is carried upon centers and is released by the motion of a short lever on the tail stock of the machine, the spindle in the tail stock being held up to the work by a spring. A back rest is provided, as this is necessary where the spindles are of very small diameter or of considerable length. The head stock is provided with tight and loose pulley and a belt shifter conveniently attached. By means of a large hand wheel, which is graduated, any desired movement of the emery wheel may be obtained as fine as $\frac{1}{1000}$ of an inch.

The table moves automatically, but may be stopped instantly at any point by pressing on one of the treadles or by



SPINDLE GRINDING MACHINE.

hand movement of the lever to which the treadles are attached. A crank permits the operator to move the table by hand. All necessary pump and water connections are furnished. The table is so arranged that all water is led back into a siphon tank and is used over again.

The machine in the illustration is for grinding comparatively short spindles but the manufacturers, the Diamond Machine Co., Providence, R. I., have made a large number for grinding fluted rolls used in speeder and twister frames. In some of these machines the table has a travel of seven feet. Of course, one of the chief features of this machine is the use of an emery wheel in place of a grindstone, but it contains many excellent ideas used in practice by the makers of spindles throughout the country. It is the first machine put on the market, in which an emery wheel is employed for the work of grinding.

A. Sorge, Jr., Marquette Bldg., Chicago, Western agent for Harrison Safety Boiler Works, has made a contract with Naugle, Holcomb & Co., of Chicago, to furnish Cochrane feedwater heaters and Cochrane live steam and exhaust separators for the new suburban railroad which they are constructing.

OUTLOOK FOR IRON TRADE WITH JAPAN.

The literature on the industrial status and possibilities of Japan, particularly in relation to competition with American manufactures and to purchases of American products, has been very considerably added to in the past year. A pamphlet of 165 pages just issued gives the results of Robert P. Porter's investigations in Japan last year, under the auspices of the National Association of Manufacturers of the United States. Mr. Porter discusses the condition of various Japanese industries and of Japanese labor, the imports to Japan and their sources, the amount of export trade and the extent to which this competition is to be feared by the United States. A good summary of the deductions that fairly may be made from the report is given in the introduction by President Search, of the National Association of Manufacturers. We quote from it the following:

"It requires only a superficial examination of the facts to show that, in certain lines in which Japanese activity has been most marked, it is impossible for American manufacturers to compete with their Oriental rivals, who enjoy the advantage of a superabundant supply of intelligent and quickly adaptable labor, willing and eager to work for wages which could not be made to supply the barest necessaries of life to the poorest American workman. Figures compiled by the Japanese Bureau of Statistics show that carpenters in Japan earn an average of 13½ cents per day in gold; blacksmiths, 12.6 cents; silk spinners, 6.7 cents; weavers (men), $1.80 per month, and farm hands, about 88 cents per month. Manifestly, it is impossible for American labor to compete with such wages, even with a large allowance for the smaller efficiency of the Japanese. It would seem that if American manufacturers are to be protected against such competition by customs laws, nothing short of absolute prohibition of the importation of the competing goods could be expected to afford the desired safeguard.

"The number of Japanese products which enter the United States in successful competition with articles of American manufacture is small at present, but the facility with which the Japanese extend their operations into various branches of industry, threatens a much broader competition from that source. Enough can be seen without exhaustive investigation to demonstrate that Japan has made marvelous progress in manufacturing, but the real industrial importance of the nation is liable to misconception and some exaggeration. The people of Japan are filled with intense industrial ambitions,

and the fervor of their utterances, together with their apprehensions of those who have come directly into competition with competition from the Orient, tend to obscure the real position of Japan. That Japan will become a great industrial nation is not to be questioned, but that this condition will be attained in a brief period of time, may be seriously doubted. "In the first place, Japan's greatest industries to-day are relatively in the stages in which the industries of the United States and Great Britain were a century ago. They are still, for the most part, household industries, using almost wholly hand labor. There are limitations to industries in these stages which even phenomenally low wages cannot remove. The progression from hand labor to machinery must naturally occur in Japan as in every industrial nation, and in this case the transition period is likely to be prolonged by the insufficiency of operatives capable of constructing, operating and repairing modern labor-saving machinery.

"This condition is calculated to accelerate the advance in wages and increase in costs of living which have been in progress for 25 years past in Japan. Statistics compiled by the Japanese Monetary System Investigating Committee show that the prices of the necessaries of life advanced 62 per cent from 1873 to 1894. What could have been bought in 1873 for the equivalent of $1 in silver, cost $1.62 in 1894, and in some items the increase was even more marked. Taking 100 as the basis in 1873, rice was worth 165 in 1894 and rent had advanced to 228. Wages also increased during the same period, but not in proportion to the advance in the cost of living. Taking 100 as representing the general average of wages in 1873, the average in 1894 was 133, an increase of one-third. The era of industrial development, into which Japan has plunged so suddenly, promises to create more rapid advances in both wages and the costs of living. These are conditions which must not be overlooked in considering the present and future of Japan's industries.

"Another influence which tends greatly to weaken the competitive power of the Japanese manufacturers is the inferiority of their products. This is particularly true of those goods which have gone abroad in the largest quantities, and it has reduced the competition of these articles to the mere question of price. Mr. Porter discusses this subject in detail and shows how the Japanese manufacturers of matting, jute rugs and silks have done enormous damage to their own trade by the sale of goods of inferior quality.

"It is not saying too much, perhaps, to assert that the greatest strength of Japan to-day lies in those industries which depend upon hand labor and require dexterity and artistic instincts. In the production of works of art or ornament Japan is unrivalled in many lines; but as the products approach the line of utility and require less skillful workmanship, they begin to show at a disadvantage in comparison with what the greater industrial nations produce in corresponding lines.

"Looking at Japan as a possible customer instead of a competitor in trade, there is promise of a large market in that country for many articles which are made in the United States and which could be sold in Japan to advantage. The domestic wants of the Japanese at present are extremely simple and are limited necessarily by the smallness of their earning power. So far as the ordinary necessaries or luxuries of life are concerned, therefore, Japan offers little promise as a possible market.

"The great industrial development which is now in progress creates a market for a great quantity of machinery, manufacturing supplies and materials. Japan buys abroad a great quantity of wood and metal-working machinery and tools, and a large share of this trade falls into the hands of American manufacturers. The remarkable imitative genius of the Japanese is cited as threatening to ruin this trade, and it is shown that they buy only a single tool or machine of each kind and make for themselves, whatever duplicates they may require. In the absence of protection for American patents or trade marks this can be done with impunity and greatly to the hindrance of the business which Americans seek to extend in Japan. This condition of unrestricted piracy of patents and trade marks in Japan is passing away with other relics of former crude civilization, and treaties have been negotiated with the leading nations which will accord full protection to foreign patent and trade mark rights. Most of these treaties will become operative in 1899, so within a comparatively short time this obstacle to trade with Japan will disappear. In spite of this present disadvantage, however, there is unquestionably an opportunity for a very considerable extension of the machinery trade which American manufacturers now have in Japan.

"The rapid extension of the railroad system of Japan has given American manufacturers large orders for rails and equipment, and there seem to be further opportunities in the same direction. The creation of a new Japanese navy also affords Americans an opportunity to demonstrate their ability to compete with other nations, for the construction of at least two of the new cruisers is assured to American shipyards.

"To express briefly the conclusions which may be drawn from Mr. Porter's investigations and from similar studies by other observant men, it seems safe to say that the ability of Japanese manufacturers to enter successfully into competition with their European and American rivals is limited at present to a few branches of industry, and the extension of this competition is likely to be somewhat restricted by changing industrial and social conditions in Japan. On the other hand, the personal wants of the Japanese themselves are too simple to create much demand for the goods which foreign manufacturers would like to sell in that country. But the growth and transformation of Japan's industries necessitate the extensive use of foreign machinery, supplies and material. The next ten years will define more clearly than is now possible the position Japan is to occupy among the industrial nations, both as a producer and as a consumer of manufactured articles."

Mr. Porter's chapter on the mineral industries of Japan makes some interesting general statements, though his investigation in this direction appears to have been of a cursory nature. We extract the following from the chapter on "Mineral Industries:"

"If Japan shall become an important factor as a manufacturing country, it will be felt both by Europe and the United States in the textile industries. On the other hand, I believe that American trade with Japan can best be increased by supplying the needs of its cities for iron and steel in machinery in the public improvements now inaugurated, and in supplying railway and bridge iron, locomotives, and rolling stock, and in the equipping of its new factories. As a manufacturing country, Japan is strongest in all branches of textiles, and probably weakest in heavy metal work. There is a locomotive works at Tokyo where some fairly good work is done. I visited also several foundries and some machine shops. There is a Government machine shop at Ozaka, which perhaps comes nearer being first-class than any other. Here they turn out excellent work. The Japanese are fully aware of their weak point, and in the Imperial Technical School I found that every available young man was put into the iron and steel department. The last session of the Diet passed a law establishing a Government foundry and a machine shop, and a member of the Cabinet has taken charge of it. Japan has just awakened to the fact that she needs good mechanics in the metal industries, that to keep up with the times she must have good iron workers as well as good wood workers. Her statesmen, moreover, are determined to build their locomotives and their warships and to make all the implements of war possible at home. The policy is to purchase abroad only what is needed immediately. There is no reason why Japan should not ultimately manufacture these things herself, but for the present she is in a large measure dependent upon other countries for them. She has a large supply of coal, in all, I think, nearly 1,500 mines now open. In Hokkaido, geologists say there are 500,000,000 tons of good coal. In Iwate, where the recent tidal wave destroyed so many lives and wiped out whole towns and villages, may be found large quantities of iron ore. Japan is not an iron country, however, and though gold and silver are found there, none of its mineral products, except coal and copper, are important.

"To show the povertyof Japan as an iron and steel producing nation, I need only call attention to the output of iron and steel. The total product in 1892 and 1893 was 16,760,000 and 15,255,000 pounds of cast iron, and 187,025 and 197,270 pounds of wrought iron, respectively. The output of steel was 2,508,000 and 1,785,000 pounds, respectively. Iron is produced chiefly in Iwate, Shimane, Tottori and Hiroshima. The total cast and wrought iron and steel produced in 1894 was as fol-

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We attribute it to the fact that there are thousands of steam users who have never heard of the Cochrane Heaters, or, having heard of them, have not investigated them or compared them with those they do know. These Cochrane Heaters are better than the ordinary run—are better than the extra good—are better than any other appliance for a similar purpose that is sold on the market to-day, yesterday, or ten years ago. Perhaps we lack in modesty in saying this ourselves, as our customers have been and are saying it for us. But then until you happened to meet them you would be losing the advantage of a good thing—a very good thing—so we decided to pocket our pride and tell you direct. Not our word for it that these Cochrane Heaters can *thoroughly* free your exhaust steam from cylinder oil, (there are nearly a thousand of our oil separators you can refer to before you need fall back on us) that they can heat water about as hot as exhaust steam can make it, can give you "real purification," etc., and do all this without getting out of order. What do they cost? Oh! They're gilt-edged! Ask us, stating how much water you want to heat, how much exhaust steam you have and whether you want to heat your building or a dryer.

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lows: Cast iron, 15,760 tons; wrought iron, 4,815 tons; steel, 932 tons.

"The ferrous ores of Iwate, those of Kamaishi iron mines, are lode iron and produce iron of very excellent quality. Iron from Shimane, Tottori and Hiroshima is produced chiefly from iron sand and is well suited for manufacturing steel. It is from Shimane, and Tottori and Hiroshima iron that the greater part of farm implements have been made.

The process of smelting being old-fashioned, it is not yet possible to apply iron produced from these districts in industrial and mechanical purposes.

"Between 1888 and 1892, inclusive, the total of iron employed at military arsenals was on an average 3,661 tons yearly; that of the navy during ten years in shipbuilding and three years in arsenals was 6,361 tons, making a total of 10,022 tons. Up to April, 1893, the total of railways already existing, or in course of construction, was 2,631 miles, which required in rails, bridges, etc., 430,232 tons. For repair and construction these railways would require an average of 17,209 tons a year. Between 1888 and 1892, inclusive, the imports of rails averaged 26,860 tons per annum. For builing merchant marine, which at the end of 1892 amounted to 97,569 tons, and of which 3,203 tons were built at home, the total of iron employed between 1888 and 1892, inclusive, is estimated at 1,414 tons a year on an average. Again, between 1888 and 1892, inclusive, the total employed at various iron works and for other purposes averaged 32,541 tons a year. Therefore the annual consumption of iron in Japan at that time stands as follows:

	Tons.
Army	3,661
Navy	6,361
Railways	26,860
Shipbuilding	1,414
Workshops	32,541
Miscellaneous	25,000
Total	95,837

"Here, then, is a need, without counting railway extension, of 100,000 tons of iron and steel annually. Why cannot the American manufacturer look after this? A market of $2,000,000 or more annually is worth looking after, and while you are on the ground after this, other business will come your way.

"According to the geological survey of various iron mines by the experts of the Department of Agriculture and Commerce, the quantity of ore available is as follows:

	Tons.
Kawaishi iron mine and its vicinity (Iwate)	14,038,525
Sennin iron mine (Iwate)	841,700
Akadani (Niigata)	373,773
Yamakoshinai (Hokkaido)	400,000

"The estimates given relate only to those sections which are situated very near the surface and can be easily worked. There are other iron yielding districts on which no accurate survey has yet been made, while the quantity of iron sand found in Saniu and Sanyo regions, that is, those districts in the mainland of Japan situated south of Kobe, is judged to be well-nigh inexhaustible. Iron produced from the iron sand, found so abundantly in the Sanyo and Saniu regions, really surpasses imported iron."

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The H. M. Whitney Mfg. Co., 1826 Olive st., St. Louis, is to buy planers, lathes, grinding and corrugating machinery, etc.

Proposals will be opened April 1 for furnishing cast-iron water pipe to Newport, Ky., for one year.

A. Weiskittel & Son, Baltimore, want machinery for grinding and preparing enamel, modern foundry appliances, etc., for stove foundry.

Bids will be opened March 8 for the construction of a system of water works and an electric light plant at Newberry, S. C. The public works commissioners let the contract.

The Norfolk (Neb.) Foundry & Mfg. Co. will add new machine tools for the purpose of manufacturing gasoline engines and hot air furnaces. The company has just taken out incorporation papers. E. A. Bullock is president and manager; C. E. Doughty, secretary, and H. H. Patterson, treasurer.

Sealed proposals will be received by the Supervising Architect, Washington, D.C., until 2 p.m., March 26, 1897, for furnishing all the labor and materials and putting in place the steel and iron construction and the cast iron finish and stairs above the fifth floor of the dome of the U. S. Postoffice and Court House at Kansas City, Mo.

At the office of the Supervising Architect, Washington, D. C., sealed proposals will be received up to 2 P. M., March 19, for all the labor and materials required for furnishing and erecting complete two hydraulic passenger elevators, including pumps, tanks, etc., for the U. S. Court House and Postoffice building at Detroit.

New Construction:—

Plans are on foot for the erection of a tin plate plant just north of Sharon, Pa., by local capitalists.

It is stated that the Osborn Saeger Co. will erect a large two-story car and repair shop at West Newton, Pa. It will build and repair all its own cars, both pit and railroad.

The new shop of Edwin Ellis & Son, of Athol Center, Mass., will be two stories high, 154 x 40 feet. A 150 horse-power engine will be installed.

The new steel elevator to be built for the Great Northern Railway at Buffalo, and requiring 5,000 tons of steel, will have 30 bins of 80,000 bushels capacity each.

In the St. John's Lutheran Church of New Britain, Conn., the steel roof trusses, which will soon be in place, have a curved outline. They will be exposed and will give the roof a light and ornamental appearance. The contract for the steel work is in the hands of the Berlin Iron Bridge Co., East Berlin, Conn.

Fires and Accidents:—

The flood damage to various iron and steel and other plants in Pittsburg, Allegheny, McKeesport and Braddock is thus

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UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick

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The First Manufactory of its Kind in the U. S.

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TENSILE STRENGTH 60,000 LBS.

HOMOGENEOUS, SOLID AND CLEAN.

HIGH ELECTRICAL PERMEABILITY.

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EDWARD E. ERIKSON,

CONSULTING AND CONTRACTING ENGINEER.

Steel Plants, Sheet and Tin Plants, Gas Furnaces and Producers Structural Iron and Steel.

Automatic Billet Heating Furnaces. Plans and estimates furnished.

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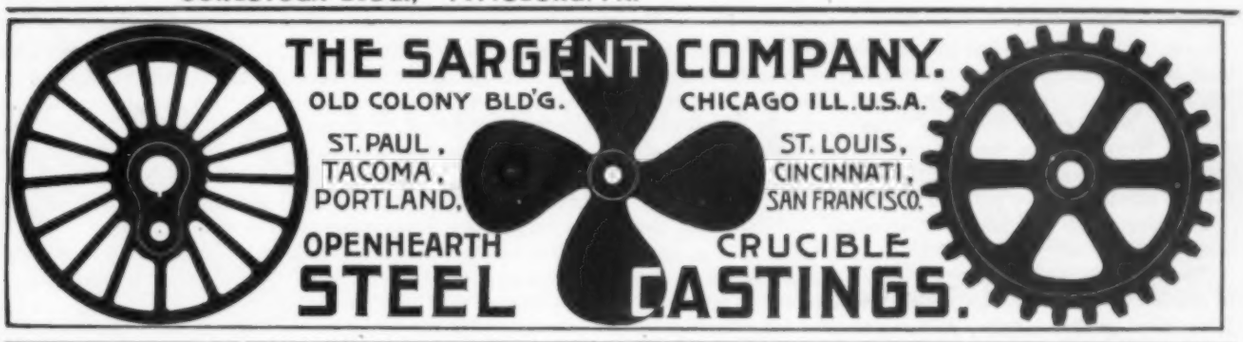


given by the Pittsburg *Times:* Carnegie Steel Co., Ltd., $25,000; Westinghouse Electric & Mfg. Co., $5,000; Wayne Iron Works, $6,000; McIntosh-Hemphill Co., $6,000; Pittsburg Steel Casting Co., $3,000; Pittsburg Bridge Co., $3,000; Armstrong Coke Co., $300; Oil Well Supply Co., $250; Pennsylvania Tube Co., $20,000; Pittsburg Tube Works, $1,000; Pittsburg Steel & Iron Co., $1,000; Laughlin & Co., Ltd., $500; Lindsay & McCutcheon, $1,000; C. G. Hussey Copper Co., $500; Pittsburg Gas Co., $5,000; John Robson & Sons, coke plant, $1,000; National Tube Works, McKeesport, $40,000; W. Dewees Wood, McKeesport, $75,000; United States Iron & Tin Plate Co., Demmler, $20,000; Monongahela Blast Furnaces, McKeesport, $25,000; United Coke & Gas Co., $10,000; Edgar Thomson Steel Works, $75,000; Pittsburg Wire Works, $5,000; Consolidated Wire Co.'s plant, $15,000; Carrie Furnace, Rankin, $12,000; Duquesne Forge Co.'s plant, $3,000.

The machine shop of Coombe & Carthew, Lambertville, N. J., was burned on Feb. 17. The loss, including a large number of patterns, amounted to about $6,000.

Additions, Enlargements, Removals, Etc.:—

The Bethlehem Iron Co., Bethlehem, Pa., is building an addition that will give it one of the largest machine shops in the country.

The enlargement of the Rippel Mfg. Co.'s plant at Mt. Gilead, O., is under consideration. A light-work plant may be erected elsewhere, probably at Columbus.

C. Hanika & Son's Architectural Iron Co., at Muncie, Ind., has commenced the construction of an addition 20 x 70 feet, one story high, to be used for a foundry department.

The Enterprise Boiler Co., Youngstown, O., breaks ground this week for an addition 145 x 100 feet.

General Industrial Notes:—

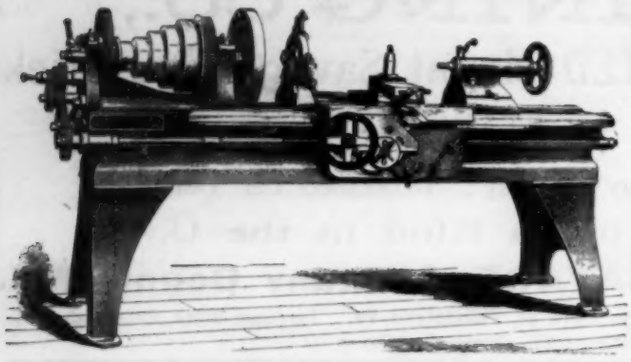
An order for 2,000 tons of barb wire has been placed with the Oliver Wire Co., of Pittsburg, and 1,000 tons has already been shipped. It is said the order is for the trochas which have been constructed by the Spanish to keep the Cuban insurgents away from Havana. The order was placed through the Spanish ambassador at Washington.

The Bethlehem Iron Co. has announced a reduction of 10 per cent in the wages of steel workers, laborers and furnacemen, going into effect March 1. The expectation is that more regular employment will be given the men, but the product has been sold at considerably lower prices than heretofore.

At Ridgway, Pa., the assignees of the J. H. McEwen Mfg. Co. sold the plant, Feb. 24, to Perry R. Smith and H. S.

U. BAIRD MACHINERY CO.

123 AND 125 WATER STREET, **PITTSBURG, PA.** 124 AND 126 FIRST AVENUE.



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All Kinds of Pipe, Globe and Gate Valves, Fittings and Appliances for Steam, Gas, Water and Hydraulic Work.

Phosphor Bronze ("Elephant Brand") Castings, Coolers, Tuyeres and Cinder Notches for Blast Furnaces supplied promptly.

Rolling Mills, Steel Works, Blast Furnaces Coal and Coke Works, Power Houses for Electric Street Railways, etc., promptly fitted up by Experienced Workmen.

AIKEN Duplex and CRITCHLOW Valves, either three or four way, for operating Mill and Hydraulic Machinery of all kinds under any desired pressure, and Stop Valves for same.

Agents for the CAMERON STEAM PUMP, which is made in every possible variety, and suitable for all purposes to which Steam Pumps can be applied.

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Thayer, both of Ridgway, for $120,650. A new stock company will be formed. The new company represents all stockholders of the old company except John E. DuBois, of DuBois, and J. H. McEwen, of Ridgway. The Ridgway Dynamo & Engine Works will be the name of the new corporation. As soon as a charter is secured the works will start up and furnish employment to 250 men.

The Union Steel plant at Alexandria, Ind., resumed last week on full time.

The Sargent Co., Old Colony Bldg., Chicago, writes us that in the last month it has had a larger business in Sargent and Ross Meehan brake shoes than in any previous month in its history. Several additional railroads have adopted the Sargent shoe as their standard, while all the old customers of the company have ordered more freely than at any previous time. In the open-hearth department the company is at work on one or two large contracts, and the prospect is that this department will soon be operated to its maximum capacity. The company has also recently started up its crucible furnaces and is now prepared to turn out work of any size or weight.

The Missouri Car & Foundry Co. has received an order from the Kansas City, Pittsburg & Gulf for 400 box cars. The D. L. & W. has ordered 300 box cars from the Jackson & Woodin Mfg. Co., Berwick, Pa.

The coupons maturing on March 1 on the Pennsylvania Steel Co. and Maryland Steel Co. consolidated 6 per cent bonds were paid on that date at the office of the Girard Life Insurance, Annuity & Trust Co., Philadelphia.

A new partnership was formed on Feb. 1, at Detroit, under the name of the J. E. Bolles Iron & Wire Works, for the manufacture of iron, wire, brass and metal work, fencing, etc. J. E. Bolles, for 15 years president and general manager of J. E. Bolles & Co., and F. F. Snow, for 15 years with the same company, are prominent in the new organization.

The directors of the Davis & Egan Machine Tool Co., of Cincinnati, elected the following officers for the ensuing year: Chas. Davis, president; W. H. Burtner, vice-president and treasurer; B. B. Quillan, secretary. A dividend of 3 per cent was declared out of the earnings of the past three months. The company did a heavy foreign business in the past six months, and added to shop equipment $34,000 worth of machinery. Important alterations are now being made, beside the erection of a large warehouse in which to store all surplus tools. This will give several hundred feet of floor space in the regular shops heretofore used as storage.

The Jno. F. Byers Co., Ravenna, O., manufacturer of hoisting engines, has resumed work in all departments, having orders enough to run for several months.

Contracts for the boiler tubes for the new armor-clad battle ships being erected by three American firms of shipbuilders have been placed with the Tyler Tube & Pipe Co., of Tylerdale, Washington Co., which has furnished tubes for the boilers used for the United States Navy for several years. Swedish iron was formerly used in part for the mixture from which these tubes were manufactured. The company now uses Lake Superior and Southern charcoal irons instead.

The steel cars, several hundred of which are to be bought for the Carnegie or Bessemer road, will be double hopper cars of 100,000 pounds capacity, 30 feet long over all, 8 feet 11 inches wide, and will have either the Fox, Schoen, Kindl, or the pressed steel diamond truck.

The Union Pacific Railway Co. has awarded to the Pencoyd Iron Works a contract for $100,000 for iron work to carry an elevated road through Omaha.

The Maryland Steel Co., Sparrow's Point, Md., will manufacture basic pig iron. Ores from Nova Scotia and Newfoundland are already in stock.

The Northern Nail & Wire Co., of Ontario, Canada, has been incorporated with a capital of $50,000.

The Baldwin Locomotive Works have sent in the last 18 months 350 locomotives to foreign countries.

The Rand Drill Co., Chicago, has recently sold to the Union Foundry Works, of Chicago, one of its 10 x 14 air compressors, to be used in operating several of the Chicago Pneumatic Tool Co.'s hammers and air drills, also air hoists, etc.

The Pennsylvania Steel Co. has started its No. 1 furnace at Steelton on spiegel after a long run on Bessemer iron. This furnace is the only active one of the company's five stacks at Steelton and Harrisburg.

The Moon Run Coal Co., of Moon Run, Pa., is about to install an electric haulage plant in its colliery, and to this end has contracted with the General Electric Co. for electrical equipment, sufficient to operate a mine road with over 3½ miles of track. The generating station will consist of one 165 k. w. 250-volt generator, directly connected to an engine 18½ x 16 inches. These, with the switchboard, will be set up in the present power house, which at present contains an air compressor plant for the operation of certain pick machines. The inside haulage will be handled by one 10 ton mining locomotive equipped with 40 h. p. motors. This will haul 40 loaded cars per trip, each loaded car weighing about two and a half tons. There will be over 3½ miles of trolley wire in the mines with the necessary feeders. Electricity was adopted by the Moon Run Coal Co. after it had made a careful investigation of all systems of mechanical haulage, cable, compressed air and steam.

The MacKinnon Mfg. Co., of Bay City, Mich., has shipped to the Northwestern Boiler Works, of Duluth, boiler plate rolls weighing over 12 tons. The top roll is 13 inches diameter, 17 feet 7 inches long over all. The two bottom rolls are each 11 inches diameter. Power is supplied by a double engine directly attached.

The Wrought Iron Bridge Co., Canton, O., builder of iron and steel bridges and other structural work, has received a contract for a new steel bridge and viaduct over the tracks of the Pennsylvania Railroad, and also over the river on College ave., York, Pa., the contract price for which is $40,000. The same company has received an order from the Long Island Railroad Co. for a bridge over the tracks at Long Island City, and an order from the Cleveland Terminal & Valley Railroad Co. for a bridge on its line at Sandyville.

The employes of the Cohoes Tube Works, of Cohoes, N. Y., have accepted a 10 per cent reduction in wages.

Arthur Ingraham has been appointed permanent receiver of the Geo. Place Machine Co., of 120 Broadway, New York.

The foreign business of the Westinghouse Machine Co., of Pittsburgh, is steadily increasing. The Paris agency of this concern recently sold four Westinghouse compound engines, aggregating 1,100 horse-power, for electric railway service in Russia.

Wm. Griffith has leased a part of the plant of the Pittsburg Steel & Iron Mfg. Co., at Pittsburg, for the manufacture of a sheet metal which, it is claimed, welds together copper and steel or brass and steel.

A 3 ton Wellman rotating open hearth steel furnace has just been added to the plant of J. A. & P. E. Dutcher Co., Milwaukee, Wis., manufacturers of iron and steel castings. It was built by the Wellman-Seaver Engineering Co., of Cleveland, and started very satisfactorily.

The Pittsburg Tool Steel Co., which has just started up its plant at Greensburg, Pa., will make some special steel at first, and from it two razors will be made for President-elect McKinley. Shipments of fine steel by this and other companies continue to be made to England. The Pittsburg Tool Steel Co. recently shipped a large order of tool steel to Southampton, Eng., and it now makes the dies for the Philadelphia mint, which formerly came from Sheffield.

To Washington, D. C.,

For the Inauguration, go via the C. T. & V. R. R., in connection with the picturesque B. & O. daylight trip over the mountains, or through sleepers on night trains. Only $11 round trip. Tickets good going March 1st, 2d and 3d. Limited to the 8th for return. See your C. T. & V. agent for particulars.

The Sloss Iron & Steel Co., Birmingham, Ala., has extended the territory covered by D. L. Cobb, Chicago sales agent of Sloss pig iron, to include St. Louis and contiguous territory.

With the blowing in of Furnace C at Braddock in February, and of Furnaces A and I a short time previous, eight of the nine Edgar Thomson furnaces are now making iron.

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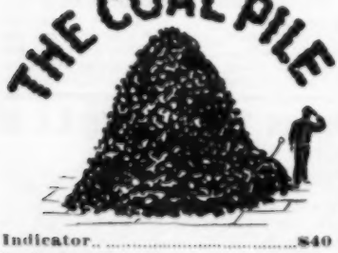
Also Towing Launches built by Marine Iron Works, Clybourn and Southport avenues, Chicago. Free illustrated catalogue. Write them for it.—*Adv.*



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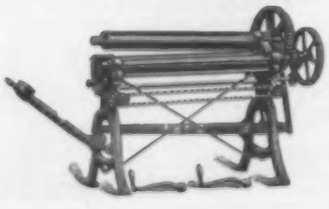

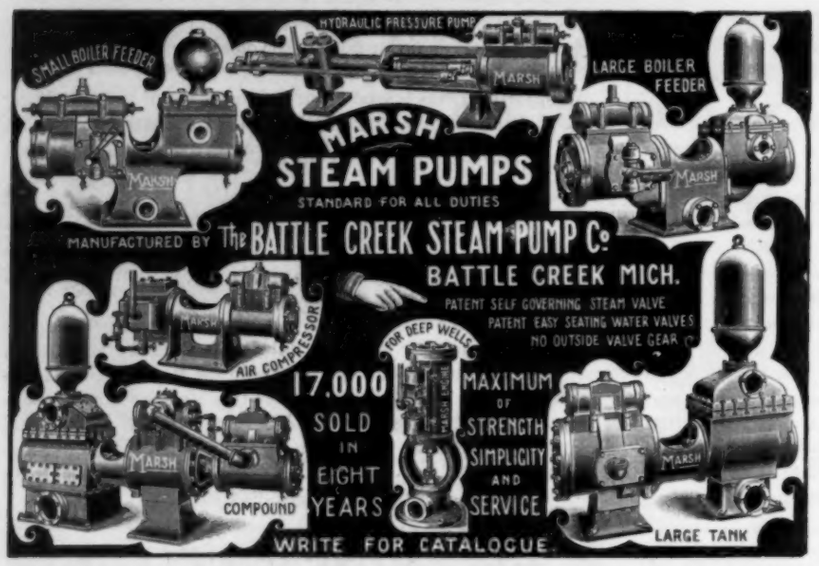

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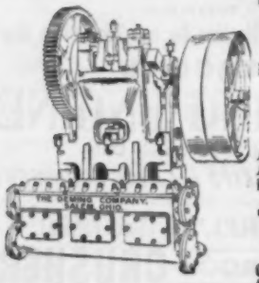

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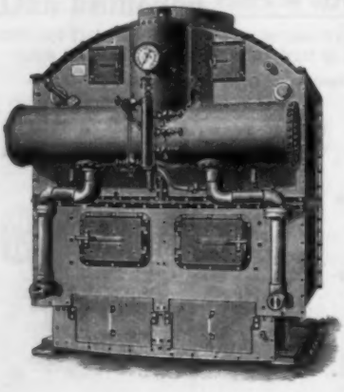

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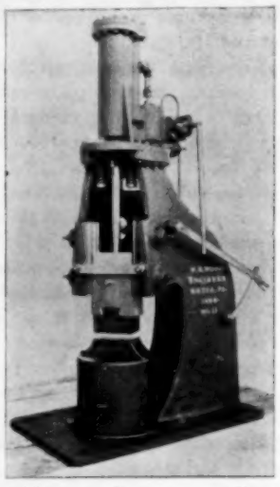

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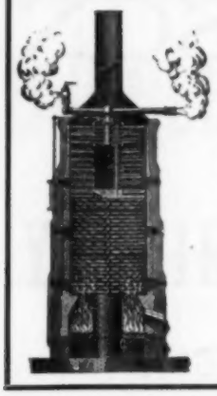

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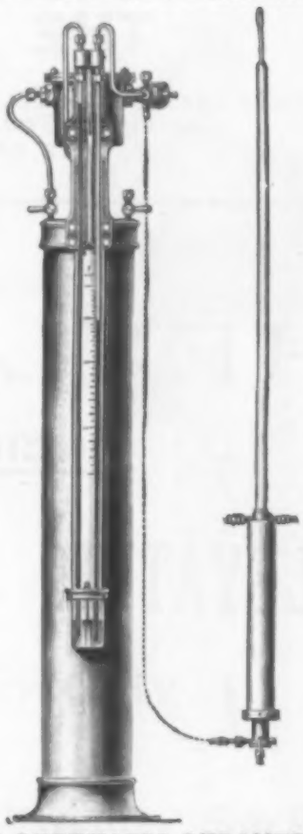

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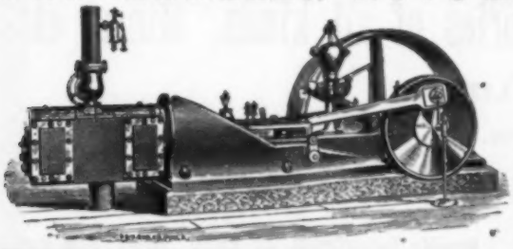

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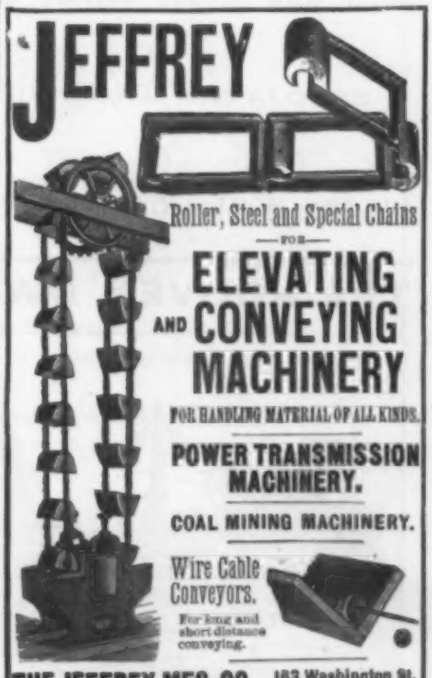

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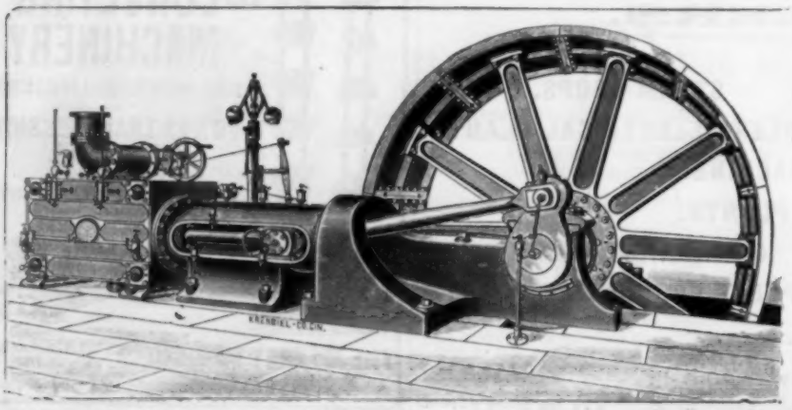

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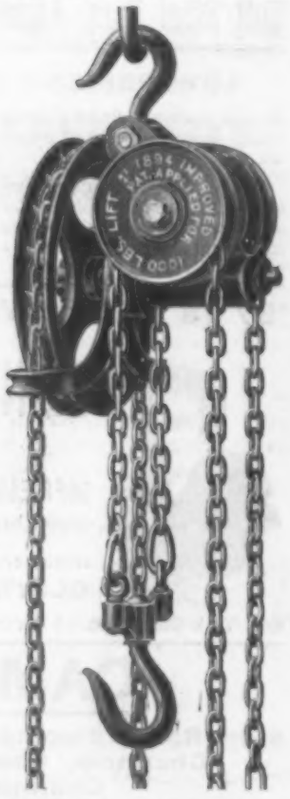

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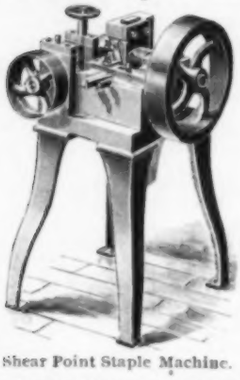

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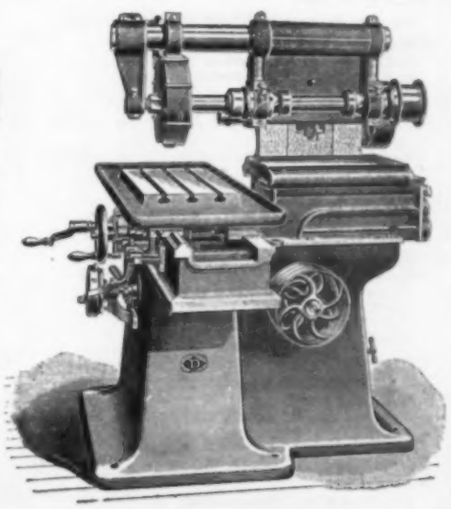

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Chicago Screw Co., Chicago, Ill.

Shafting—
The Lane & Bodley Co., Cincinnati, O.

Shearing and Punching Machinery—
Bertsch & Co., Cambridge City, Ind.
Toledo Machine & Tool Co., Toledo, O.
Wm. H. Wood, Media, Pa.

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland.
Ætna-Standard Iron & Steel Co., Bridgeport, O.

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Edwin Harrington Son & Co., Philadelphia.

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Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Steam Pipe and Boiler Covering—
C. H. Besly & Co., Chicago, Ill.

Steam Packing—
C. H. Besly & Co., Chicago, Ill.

Steam Hammers—
Beaudry & Co., Boston, Mass.

Steam Shovels and Dredges—
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
Marion Steam Shovel Co., Marion, O.

Steam Separators—
Jas. L. Robertson & Sons, New York.

Steam Specialties—
C. H. Besly & Co., Chicago, Ill.

Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.

Steel Castings—
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The Sargent Co., Chicago, Ill.

Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland.
Bethlehem Iron Co., South Bethlehem, Pa.
Cambria Iron Co., Johnstown, Pa.

Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland.

Stokers—
Playford Stoker Co., Cleveland, O.
Brightman Furnace Co., Cleveland, O.
Westinghouse, Church, Kerr & Co., Pittsburg, Pa.

Tanks—
S. Freeman & Sons Mfg. Co., Racine, Wis.
Enterprise Boiler Co., Youngstown, O.

Tinning Machinery—
The Lloyd-Booth Co., Youngstown, O.

Tin Plate—
Ætna-Standard Iron & Steel Co., Bridgeport, O.

Tools—
L. S. Starrett Co., Athol, Mass.

Tool Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.
C. H. Besly & Co., Chicago, Ill.

Transmission Machinery—
Link-Belt Machinery Co., Chicago, Ill.

Tube Welding—
S. Fix Sons, Cleveland.

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Cleveland City Forge & Iron Co., Cleveland.

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C. H. Besly & Co., Chicago, Ill.

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Buffalo Forge Co., Buffalo, N. Y.
B. F. Sturtevant Co., Boston Mass.

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John Adt & Son, New Haven Conn.

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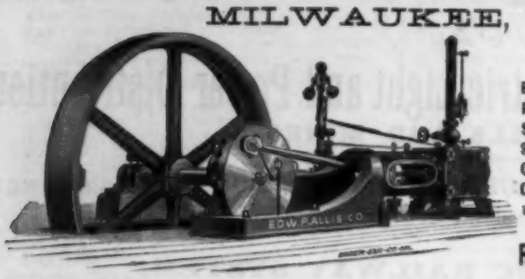
MILWAUKEE, WIS.



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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

	PAGE
Adt & Son, John	27
Ætna-Standard Iron & Steel Co	26
Aitchison, Rob't Perforated Metal Co	31
Allis & Co., Edward P	30
Almy Water Tube Boiler Co	22
Atwood & M'Caffrey	20
Bacon, Earle C	21
Baird Machinery Co	20
Battle Creek Steam Pump Co	22
*Beaudry & Co	30
Besly & Co., C. H	36
Bethlehem Iron Co	35
*Berger Mfg. Co	—
*Bertsch & Co	21
Bickford, H	36
Bourne-Fuller Co	26
Brass Founders Supply Co	32
Brightman Furnace Co	36
*Brown, Edward	36
Brown Hoisting & Conveying Machine Co	35
Bucyrus Steam Shovel & Dredge Co	24
Buffalo Forge Co	1
Cahall Sales Department	1
Cambria Iron Co	26
Card Electric Co	35
Chicago & Northwestern Ry	33
Chicago Screw Co	1
Clayton Air Compressor Works	2
Clearfield Fire Brick Co	35
Cleveland & Buffalo Transit Co	37
Cleveland City Forge & Iron Co	1
Cleveland Electrotype Co	35
*Cleveland Galvanizing Works	—
Cleveland Rolling Mill Co	26
Clinton Iron & Steel Co	26
*Clonbrock Steam Boiler Co	—
*C. M. & St. P. Ry	—
Coffman Coke Co., W. H	26
Cole, J. Wendell	36
Deming Co	22
*Diamond Machine Co	27
Dickman & MacKenzie	1
*Dietz, Schumacher & Boye	22
Dixon, Jos. Crucible Co	31
Dover Fire Brick Co	35
Drake, Bates & Co	26
East Chicago Foundry Co	19
Emmerton, F. A	2
Enterprise Boiler Co	1
Eriksou, Edward E	19
*Fix Sons	—
Fleharty, J. H. & Co	2
Forster, Waterbury & Co	1
*Freeman & Sons, S	—
*Fulton Steam Boiler Wks. & Fdy. Co	—
Gates Iron Works	2
General Electric Co	24
Gerlach, Peter & Co	35
Gobeille Pattern Co	36
Hanna & Co., M. A	26
Harrington & King Perforating Co	34
Harrington, Sou & Co., Edwin	25
Harrison Safety Boiler Works	18
Hartford Steam Boiler Insp. & Ins. Co	35
Hazelton Boiler Co	23
Heyl & Patterson	24
Hooven, Owens & Rentschler Co	24
Hughes Steam Pump Co	23
Hunt & Co., Robert W	2
Illinois Central R. R	27
Illinois Screw Co	1
Iron Clad Paint Co	31
Jeffrey Mfg. Co	23
Jenkins Bros	21
Jessop & Sons, Ltd., Wm	27
Jones Foundry Co., W. A	1
Junction Iron & Steel Co	2
Kellogg Weldless Tube Co	25
Lane & Bodley	32
Lake Superior Consolidated Iron Mines	26
Link-Belt Machinery Co	33
Lloyd Booth Co	34
*Lodge & Shipley Machine Tool Co	—
Lorain Foundry Co	1
Magnolia Metal Co	1
Marine Iron Works	21
Marion Steam Shovel Co	35
Moore Mfg. Co	1
†Newport Sand Bank Co	—
Nolte Brass Co	36
Norman Co., J. J	35
North American Metaline Co	36
Norwalk Iron Works Co	2
Nuttall Co. The R. D	32
Oglebay, Norton & Co	26
†Ohio Sand Co	—
Pickands, Brown & Co	2
Pittman, C. K	2
Pollock, Wm. B. & Co	2
Playford Stoker Co	31
Prouty Co., The	2
Pullman, J. Wesley	26
Q. & C. Co	36
Rand Drill Co	2
Rand, Chas. F., Prest	26
Rippel Mfg. Co	1
Reese, Hammond & Co	36
*Robertson & Sons, Jas. I	21
Rockwell & Co., W. S	33
Sargent Co., The	19
‖Sharon Fire Brick Works	—
Shiffler Bridge Co	22
Southwark Foundry & Machine Co	23
Starrett Co., L. S	1
Sterling Emery Wheel Mfg. Co	34
Stilwell-Bierce & Smith Vaile Co	2
Stevens, F. B	36
Stuart Fire Brick Co	33
Sturtevant Co., B. F	2
Superior Machine Co	36
Sykes Iron Roofing Co	32
Textor, O	2
Tod, Wm. & Co	31
Toledo Machine & Tool Co	35
Uehling, Steinbart & Co	23
Union Mining Co	19
Upson Nut Co	1
Westinghouse Electric & Mfg. Co	29
Westinghouse, Church, Kerr & Co	23
Westinghouse Machine Co	27
Wood, Wm. H	22
Worthington, Henry R	22
Wellman Seaver Engineering Co	36

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	$4.50@4.75
No. 1 Bessemer hematite	4.00@4.25
Hematites No. 1 non-Bessemer	2.25@2.50
No 1. Specular, non-Bessemer	2.75@3.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$ ... 10 90
No. 1 Strong Foundry	11 25@11 50
No. 2 Strong Foundry	10 50@11 00
No. 1 Gray Forge, red short	... ... 9 50
No. 2 Gray Forge, neutral	... ... 9 75
No. 1 American Scotch	... ... 11 40
No. 2 American Scotch	... ... 10 90
Lake Superior Charcoal	... ... 13 50
PITTSBURG:	
No. 1 Foundry	$11 20@11 25
No. 2 Foundry	10 50@10 75
Gray Forge	... ... 9 50
White and Mottled	... ... 9 25
Warm Blast Charcoal	15 00@16 00
Cold Blast Charcoal	... ... 20 00
Bessemer	10 75@10 85
CHICAGO:	
Lake Superior Charcoal	$13 50@$14 00
Local Coke Foundry No. 1	11 50@12 00
Local Coke Foundry No. 2	11 00@11 50
Local Coke Foundry No. 3	10 75@11 00
Local Scotch Foundry No. 1	11 50@12 00
Local Scotch Foundry No. 2	11 00@11 50
Local Scotch Foundry No. 3	10 75@11 00
Southern Coke No. 1	11 15@11 40
Southern Coke No. 2	10 65@11 15
Southern Coke No. 3	10 40@10 65
Southern No. 1 Soft	10 90@11 40
Southern No. 2 Soft	10 65@10 90
Southern Silveries	11 40@11 60
Jackson Co. Silveries	14 00@16 05
Ohio Silveries No. 1	15 00@15 50
Ohio Silveries No. 2	14 50@15 05
Ohio Strong Softeners	14 00@14 20
Alabama Car Wheel	16 00@16 50
Malleable Bessemer	12 00@12 25
Coke Bessemer	13 00@13 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$10 25@10 50
Southern Coke No. 2 and No. 1 Soft	9 75@10 00
Hanging Rock Coke, No 1	12 50@13 50
Hanging Rock Charcoal No. 1, Fdy	15 00@16 00
Tennessee Charcoal No 1	13 00@14 00
Jackson County Silvery No 1	13 50@14 00
Southern Coke, Gray Forge	... ... 9 25
" " Mottled	... ... 9 25
Standard Alabama Car Wheel	14 75@15 50
Tennessee " "	13 50@14 50
Lake Superior " "	14 75@15 25
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$ ... $12 00
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 75@12 00
Ohio Strong Softener No. 1	... ... 12 25
Jackson Co. Silvery No. 1	... ... 14 25
Lake Superior Charcoal	... ... 14 00
Southern Soft No. 1	... ... 12 00
Hanging Rock Charcoal	... ... 17 00
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$ ... $11 00
Southern Coke No. 2	... ... 10 50
Southern Coke No. 3	... ... 10 00
Southern Gray Forge	... ... 9 75
Southern Charcoal No. 1	... ... 15 00
Missouri Charcoal No. 1	14 00@14 00
Ohio Softeners	... ... 15 50
Lake Superior Car Wheel	... ... 15 20
Southern Car Wheel	... ... 15 25

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	Gross Tons
Old iron rails	$14 50
Old steel rails	10 50
Old car wheels	10 00
	Net Tons
No. 1 R. R. wrought scrap	$10 50
Mill scrap	8 00
No. 1 Machine cast scrap	8 50
Iron axles	14 50
Axle turnings	7 50
Wrought turnings (free from cast)	6 75
Cast borings	5 00
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 00
Pipes and flues (clean)	8 00
Tank iron	8 00
Hoop and band iron	6 00
Sheet iron	5 00
Wrought drillings	6 00
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland	1.65c
Angles	1.25c
Tees	1.35c
Universal Plates	1.25@1.30c
Sheared Plates	1.30c

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]

Rounds and Squares.—Bar Iron.

1 to 1⅞	1.20 Base.
2 to 2⅞	.20 extra.
3 to 3½	.50 "
3½ to 4	.80 "
4½ to 4½	1.00 "
4½ to 5	1.30 "
5½ to 6	1.80 "
6¼ to 6½	2.20 "

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OF ALL KINDS FOR

MILLING, MINING AND AGRICULTURAL MACHINERY.

Perforated Iron, Steel, Copper, Brass, Tin, Zinc, Lead, Etc., to Order.
Large and Varied Assortment of Sizes. Correspondence Solicited.

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Used Dry, or Mixed with Water, Oil or Grease

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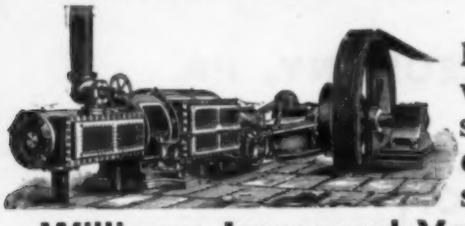

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For Direct Electrical and all High Class Work.

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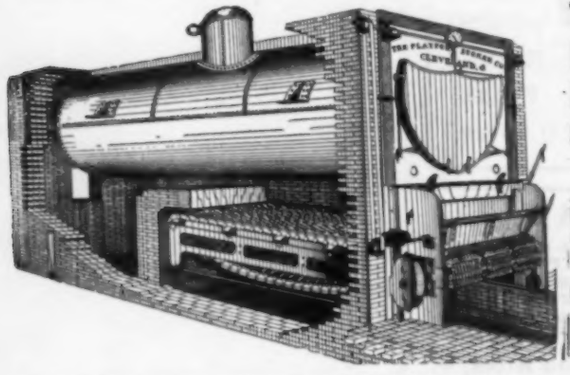
Park Building, Pittsburg, SEWARD S. BABBITT.



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Guaranteed to

Abolish smoke, to increase boiler capacity and to save fuel.

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No. 61 Case Library Bldg., CLEVELAND, O.

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CLEVELAND OHIO.

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Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

6¾ to 7½	2.50 extra.
¾ to ⅞	.10 "
5⁄8 to 11-16	.20 "
½ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-32	.50 "
5-16 to 11-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1½ to 4 x ⅜ to 1	1.20 Base.
4¼ to 6 x ⅜ to 1	.10 extra.
6¼ to 8 x ⅜ to 1	.60 "
8¼ to 10 x ⅜ to 1	.80 "
1⅜ to 4 x 1 1-16 to 1½	.30 "
4¼ to 6 x 1 1-16 to 1½	.40 "
6¼ to 8 x 1 1-16 to 1½	.60 "
8¼ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1⅝ to 2	.50 "
4¼ to 6 x 1⅝ to 2	.60 "
6¼ to 8 x 1⅝ to 2	.80 "
8¼ to 10 x 1⅝ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4¼ to 6 x 2⅛ to 3	.80 "
6¼ to 8 x 2⅛ to 3	1.00 "
1⅜ to 1¾ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅝	.20 "
¼ to 15-16 x ⅜ to ¾	.40 "
5⁄8 to 11-16 x ⅜ to ⅝	.50 "
½ to 9-16 x ⅜ to ⅝	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1⅝ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	30 "
¼ to 15-16 x ¼ to 5-16	.50 "
5⁄8 to 11-16 x ¼ to 5-16	.80 "
⅜ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge shaft iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra.
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1⅝ to 4 x No. 9 to 3-16	.40 "
1⅝ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1 30 "
7-16 to ½ x Nos. 10, 11 and 12	1 40 "
⅜ x No. 9 to 3-16	1.50 "
⅜ x Nos. 10, 11 and 12	1.60 "

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in. .70

Sand Band Iron, 1-10 c. above same sizes of Light Bands.

Oval Iron.

⅜ to 1⅝	.40 extra.
¾ to 13-16	.50 "
⅝ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅝ to 11-16 x ¼	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra.
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4 50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron

All sizes 1 c extra.

Cutting ordinary bars to specified length, 20 to 30 extra, according to length and size.

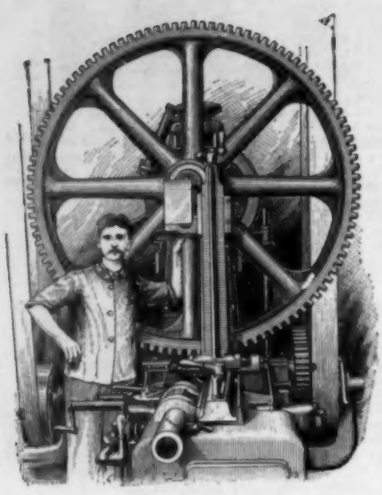
Steel Bands.

Width In Inches.	English Standard Gauge.	
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16 "	1.30 Base.
		Extras.
1½ to 6,	" 10, 11, 12 or 1⁄16"	.05 per 100 lbs.
1 to 1⅜,	" 7, 8, 9 or 3-16"	.10 "
1 to 1⅜,	" 10, 11, 12 or 1⁄16"	.15 "
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20 "
13-16 and ⅞,	" 10, 11, 12 or 1⁄16"	.25 "
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30 "
11-16 and ¾,	" 10 11, 12 or 1⁄16"	.35 "
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40 "
9-16 and ⅝,	" 10 11, 12 or 1⁄16"	.45 "
½, Nos. 7, 8, 9 or 3-16"		.55 "
½, " 10, 11, 12 or 1⁄16"		.60 "
7-16 " 7, 8, 9 or 3-16"		.75 "
7-19 " 10, 11, 12 or 1⁄16"		.85 "
⅜, " 7, 8, 9 or 3-16"		.95 "
⅜, " 10, 11, 12 or 1⁄16"		1.05 "

Iron and Steel Hoops.

Width in Inches.	English Standard Gauge.	
1 7-16 to 3	Nos. 13, 14, 15 and 16	1 60 Base
		Extras
1 7-16 to 2,	" 17, 18, and 19	.05 per 100 lbs.
1 7-16 to 2,	" 20	.10 "
1 7-16 to 2,	" 21	.15 "
1 7-16 to 1¾,	" 22	.25 "
1 5⁄16 to 1⅜,	" 13, 14 and 15	.05 "
1 5⁄16 to 1¾	" 16, 17 and 18	.10 "

GEAR CUTTING



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OUR SPECIALTY.

Are you using gears?

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We make a special gear for running in hot metal.

Try it.

R. D. NUTTALL CO.,

99 BOQUET STREET, ALLEGHENY, PA.

THE BRASS FOUNDERS' SUPPLY CO.

FURNACES, FLASKS, FOUNDRY Supplies and Specialties.

Send for our Catalogue and look at the Ribbed Flask.

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We are the only Steel Roofing Co. awarded Medal and Diploma for **PATENT CAP ROOFING** at World's Columbian Exposition. We are also large manufacturers of all styles of METAL ROOFING, SIDING, CEILING, ETC. Send for Catalogue and Price List. Mention this paper.

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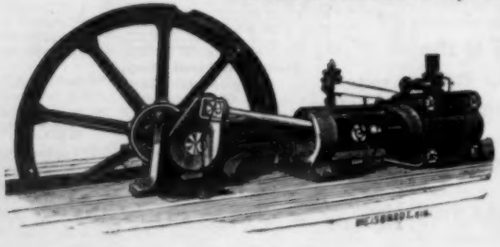
THE LANE & BODLEY CO.,

CINCINNATI, OHIO.



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ALL SIZES.

Simple and Compound.

Shafting, Hangers, Pulleys.

Belt Elevators, Saw Mills.

1⅛ to 1¼,	"	19 and 20	.15 per 100 lbs
1⅛ to 1¼,	"	21	.20 "
1⅛ to 1¼,	"	22	.30 "
15-16 and 1,	"	13, 14 and 15	.10 "
15-16 and 1,	"	16, 17 and 18	.15 "
15 16 and 1,	"	19 and 20	.20 "
15-16 and 1,	"	21	.25 "
15-16 and 1,	"	22	.35 "
⅞,	Nos.	13, 14 and 15	.20 "
⅞,	"	16, 17 and 18	.25 "
⅞,	"	19 and 20	.30 "
⅞,	"	21	.35 "
⅞,	"	22	.45 "
¾ and 13-16	Nos.	13, 14 and 15	.30 "
¾ and 13-16	"	16, 17 and 18	.35 "
¾ and 13-16	"	19 and 20	.40 "
¾ and 13-16	"	21	.45 "
¾ and 13-16	"	22	.50 "
¾ and 13-16	"	23	.60 "
11-16,	Nos.	13, 14 and 15	.35 "
11 16,	"	16, 17 and 18	.40 "
11-16,	"	19 and 20	.50 "
11-16,	"	21	.60 "
11-16,	"	22	.70 "
11-16.	"	23	.80 "
5/8,	Nos.	13, 14 and 15	.40 "
5/8,	"	16, 17 and 18	.45 "
5/8,	"	19 and 20	.55 "
5/8,	"	21	.65 "
5/8,	"	22	.75 "
5/8	"	23	.85 "
9 16,	"	13, 14 and 15	.45 "
9-16,	"	16, 17 and 18	.50 "
9-16,	"	19 and 20	.60 "
9-16,	"	21	.70 "
9-16,	"	22	.80 "
9-16,	"	23	.90 "
½,	"	13, 14 and 15	.55 "
½,	"	16, 17 and 18	.60 "
½,	"	19 and 20	.70 "
½,	"	21	.80 "
½,	"	22	.90 "
½,	"	23	1.00 "
7-16,	"	13, 14 and 15	.80 "
7-16,	"	16, 17 and 18	.90 "
7-16,	"	19 and 20	1.00 "
7/16,	"	13, 14 and 15	1.00 "
7/16,	"	16, 17 and 18	1.10 "
7/16,	"	19 and 20	1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 60
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2 10
No. 25-26	2 20
No. 27	2 30

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

The Link-Belt Machinery Co.

ENGINEERS. FOUNDERS. MACHINISTS.

CHICAGO, U. S. A.

Modern Methods as applied to the handling of Iron Ore, Coal, Raw and Manufactured Products.

Manila Rope, Power Transmissions, Shafting, Pulleys, Shaft Bearings, Gearing, Friction Clutches, etc.

IMPROVED DUPLEX SYSTEM

- - - FOR - - -

BURNING FUEL OIL.

Heats and cleans the oil and delivers it to the fires under high and uniform pressure.

Entirely automatic, most scientific, sensible and economical method of burning oil in existence. If you are operating a Steel Works, Brass or Copper Rolling Mill, Malleable Iron Works, Bolt and Nut Works, Bicycle Works, or do Annealing, Forging, Brazing, Tempering, Japanning, Enameling, Case Hardening, you can use this machine to your advantage.

WE BUILD FURNACES OF ALL KINDS. SATISFACTION GUARANTEED.

W. S. ROCKWELL & CO.,

26 CORTLANDT STREET, NEW YORK.

THE 1896 EDITION

OF THE

Iron and Steel Directory

Will be sent postpaid by *The Iron Trade Review* at **$6.**

Is a thorough revision of the list of blast furnaces, rolling mills, Bessemer and Open-Hearth steel works, plate and sheet mills, nail mills, tin plate mills, malleable, cast iron pipe and wrought pipe works, car wheel and locomotive works.

STUART FIRE BRICK CO.

MANUFACTURERS OF

Silica Brick

For Open-Hearth, Basic and Acid Steel Furnaces, Glass and Copper Tank Furnaces. Extra Shapes MADE TO ORDER.

Office, Room 21, Conestoga Bldg., Cor. Wood and Water Sts., PITTSBURG. PA.

The Chicago & North-Western Railway

REACHING with its 7,966 miles of road the famous Water Powers, Coal Fields, Iron Ore Ranges, Hard and and Soft Lumber Districts located in Illinois, Wisconsin, Michigan, Iowa, Minnesota, South Dakota, North Dakota, Nebraska and Wyoming, and by traffic arrangements with other railways, 7,350 stations located on 41,000 miles of railroad (one-ninth of the entire railroad mileage of the world, and one-fourth of the railroad mileage of the United States), has on its line more industries than any other western railroad.

Manufacturers contemplating moving or establishing branch factories in the West are requested to inquire what we can offer them before locating elsewhere.

M. HUGHITT,
General Freight Agent,
CHICAGO.

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05

Above includes plates 90 inches w de.

90 to 96 in. wide	¼c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special.

Plates.	cts. lbs.
2 to 9-16 in. wide by 2 to 5/8 thick	.08

Bessemer and O. H. Steel.

Bessemer Machinery, base price,	1 40
Open-hearth Tire "	1 45
Open-hearth Spring "	1 80
Sleigh Shoe "	1 45
Toe Calk "	1 90
Cutter Shoes, tapered and bent "	1 60

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON.	cts lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08
7-16 to ⅜ and 2⅜ to 3 in.	09
3⅛ to 4 in	09½
⅝ to 11-16 and 4½	10
⅞ to 6 in	10½
¾ to 9-32 and 6⅛ to 7 in	11
1 in.	13

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 60
Bridge ½, ⅝, 11-16 and ¾ inch diam	2 55

Wrought Pipe and Boiler Tubes.

Lap weld black base, four 10s	62
Butt " " " four 10s	61½
Lap " galv. " four 10s	52½
Butt " " " four 10s	50
Boiler tubes 2½" and smaller	70
Boiler tubes 2½" and larger	75
Casting screw and socket joint dis.	52½
Casing inserted joint dis.	47½

MACHINERY SUPPLY MARKET.

[From Store, Cleveland.]

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths' Hill's	dis 40
Blacksmiths' Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70 & 10
" " " extra	dis 60&10
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 50
Shults Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shults Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 80
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 33⅓
Horton's Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 45
Sweetland "	dis 40
Almond Drill	dis 40
Morse "	dis 20
Skinner's Combination Lathe	dis 40&15
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 30

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 10 to 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	
Morse Taper & Straight Shank to 1½"	dis 50 & 10 to 60
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 60&10&5
Cleveland " "	dis 60&10&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F.
Kegs ₩ lb	4½c	5 c	2½c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 50@50&5
H. H. Barton.....dis 50@50&5

Emery Wheels.

Detroit.....dis 60@70
Norton's.....dis 60@70
Grant.....dis 60@70
Sterling.....dis 60@70
Celluloid.....dis 10&33⅓
Northampton.....dis 50
Crystal.....dis 65@70
Vitrified.....dis 60@70
Vulcanite.....dis 60&10
Hamden.....dis 60&10@70
Cyclone.....dis 60@60&10

Files.

Arcade.....dis 60&10@60&10&10
Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
McClellan.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs.....10c
" " " " over 5 lbs.....8c

Jack Screws.

Illinois Bolt Co. list.....dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5¾	4¾	4	3¾	3¼
Hexagon	15¾	11¾	8¾	6	5¾	5¼	
Washers	9	8	7	5	4½	4½	4¼

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

Standard Penny Nails, ₩ keg, base.
Car lots.....$1.50
Less than car lots...$1.60

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Rivets.

Iron, Thousand, list November 1, 1894.....dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894.....dis 60@65
Copper.....dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " " .....dis 50
Morse " " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

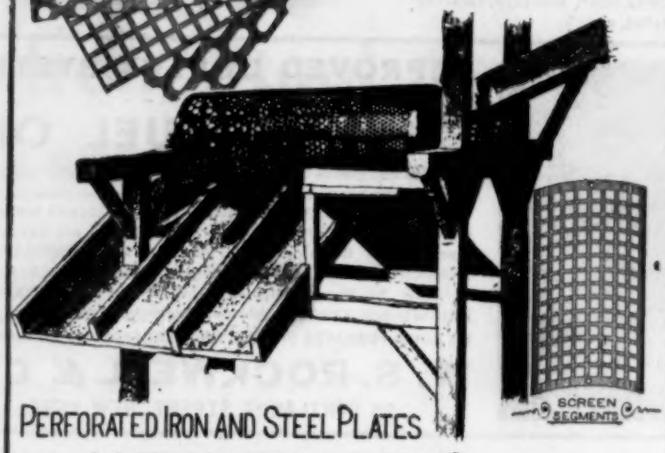
New List, Apr. 9, 1894

Brass.....dis 35c
Copper.....dis 35c
Bright and annealed, Nos. 0@18.....dis 70&10@75
" " Nos. 19@26.....dis 75@75& 5
" " Nos. 27@36.....dis 75&10& 5
Coppered Nos. 0 to 18, market list.....dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis65&
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....95c ₩ lb dis 30

Persistence In Advertising

Is one of the requisites of satisfactory results. In the expansion of business which is confidently expected in the United States in the very near future advertisers who have made themselves regularly prominent in the past two years will be first to reap the rewards of persistent publicity.

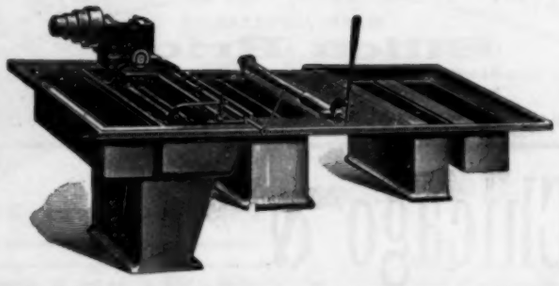
THE HARRINGTON AND KING PERFORATING CO.
CHICAGO, ILL.



PERFORATED IRON AND STEEL PLATES
FOR SCREENING AND SIZING
COAL. COKE. ORE. STONE &C.
BRONZE PLATES TO WITHSTAND THE ACTION OF MINE WATERS.
PLATES FURNISHED FLAT, OR ROLLED TO CYLINDRICAL FORM FOR REVOLVING SCREENS.
PERFORATIONS IN ROUND, SQUARE, OR OBLONG HOLES.
WE DO NOT FURNISH SCREENS COMPLETE, ONLY PERFORATED SCREEN PLATES.

THE LLOYD-BOOTH CO., YOUNGSTOWN, OHIO.

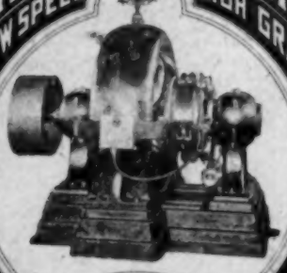
Tinning MACHINERY.



Rolling Mills, Sand and Chill ROLLS.

STERLING EMERY WHEEL MFG. CO.
TIFFIN, O.

CORRESPONDENCE SOLICITED
AGENTS:
Chicago Branch, 59 So. Canal St.
The Geo. Worthington Co., Cleveland.
Somers, Fitler & Clarke, Pittsburg

BELT DRIVEN DIRECT DRIVEN
DYNAMOS AND MOTORS
SLOW SPEED HIGH GRADE

THE CARD ELECTRIC CO.
MANSFIELD, OHIO, U.S.A.

If you are thinking of enlarging your mill, foundry or machine shop, or of purchasing machinery of any kind, send us a line giving character of machinery needed. We can put you in communication with manufacturers from whom you can buy advantageously.

J. M. ALLEN, President.
WM. B. FRANKLIN, Vice-President.
F. B. ALLEN, Second Vice-President.
J. B. PIERCE, Secretary and Treas.

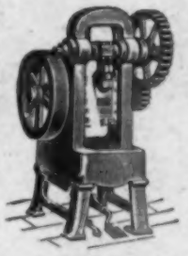
HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.
HARTFORD, CONN.

BURWELL & BRIGGS, General Agents, 32 Wilshire Bldg., Cleveland, O.
C. A. BURWELL, Chief Inspector, 32 Wilshire Bldg., Cleveland, O.
J. E. WOLCOTT, Special Agent, 96 4th Avenue, Pittsburgh, Pa.

CLEVELAND ELECTROTYPE CO.
ELECTROTYPING ENGRAVING AND STEREOTYPING.
50 HIGH ST. — TEL. 2139.

ESTABLISHED 1854.
PETER GERLACH & CO.,
MAKERS OF
Saws, Tools and Machinery.
Office and Warerooms, 28 Columbus St.
Factories on Columbus, Winter and Leonard Sts.
Cleveland, Ohio, U. S. A.

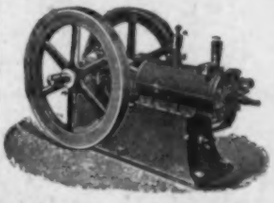
THE BETHLEHEM IRON CO.,
Principal Office and Works,
SOUTH BETHLEHEM, PA.
STEEL RAILS.
BILLETS AND MUCK BAR,
STEEL FORGINGS.
HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.
Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.
NEW YORK OFFICE, 100 BROADWAY. PHILADELPHIA OFFICE, 421 CHESTNUT ST.
CHICAGO OFFICE, MARQUETTE BUILDING.


No. 54 Power Press

TOLEDO MACHINE & TOOL CO.,
501-505 Superior St., Toledo Ohio.
We manufacture
Power Punches. Forging Presses.
Power Presses. Trimming Presses.
Straight Sided Double Pitman Presses.
Drop Presses.
Embossing Presses. Automatic Feed Presses.
Stamping Presses. Power Slitting Machines.
Riveting Machines. Power Shears.
Special and Automatic Machinery Dies for all classes of work in sheet metals.
Write for catalogue and prices.

No. 75 Power Press

THE "CLEARFIELD" FIRE BRICK
MANUFACTURED BY
THE CLEARFIELD FIRE BRICK CO., Limited,
Office and Works at CLEARFIELD, PA.
929 Liberty Street, Pittsburg, Pa., John Richardson, Agent.



THE CHICAGO GAS and GASOLINE ENGINE
The simplest gas and gasoline engine on the market. Has no equal for absolute, steady speed and durability. It is a dwarf in size and a Samson in strength.
Catalogue sent on application.
MANUFACTURED BY
J. J. NORMAN CO., 60 S. Clinton St., Chicago, Ill.

The Iron Trade Review
Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year $3.00.

THE BROWN HOISTING AND CONVEYING MACHINE CO. CLEVELAND, O.
MACHINERY FOR HANDLING COAL AND ORE.
CRANES
NEW YORK, HAVEMEYER BLDG.
PITTSBURG, CARNEGIE BLDG.
CHICAGO, MARQUETTE BLDG.

KING'S SIX TON ELECTRIC CRANE
Can be furnished at low cost.
Write for full information to the MARION STEAM SHOVEL CO Marion, Ohio.

FIRE DOVER FIRE BRICK CO., BRICK
MANUFACTURERS OF
Furnace, Mill and Special Shape Fire Brick.
Office, 44 Mercantile Bank Bldg.,
CLEVELAND, OHIO.

THE

VELLMAN,

SEAVER

NGINEERING CO.,

w England Bldg.,

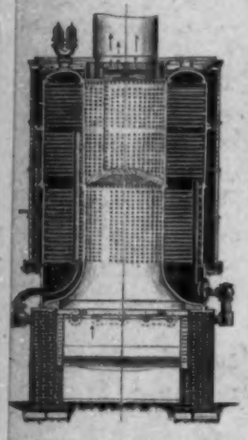
LEVELAND, O.

ENGINEERS

AND

CONTRACTORS.

e make a specialty of the de- and construction of STEEL ORKS, ROLLING MILLS STEEL WORKING MA- INERY. Metallurgical rnaces of all kinds. Steel ldings for all purposes. Spe- Electric and other power velling Cranes and Gantries.



e have undertaken to exploit Berry Safety Boiler.

WHY?

ecause after watching it in the dest kind of service for two rs, we are fully convinced that embodies in its construction re good points than any other ler ever built.

will be manufactured at the rks of John Mohr & Sons, icago, which fact alone is a rantee that both material and rkmanship will be the best t money can buy.

me of the good points of the ry Boiler are the following:

It gives uniformly DRY STEAM.

It is SAFE and durable.

is economical in first cost.

is economical in maintenance.

gives the greatest horse-power per square foot of floor space occupied.

end for our descriptive pam- let, which will tell you the ole story.

THE HART OR DETROIT

Emery Corundum Wheels and Machinery:

Write to J. WENDELL COLE, M. E.,

District Manager, No. 911 Chicago Opera House Block, Chicago, Ill., or Box 84, Columbus, O.

N. B.—Also Agent or WM. SELLERS & CO.'S SPECIAL TOOL GRINDER and TWIST DRILL GRINDER WITH POINTER, for Pennsylvania, Ohio, Indiana, Illinois and Wisconsin.

AUTOMATIC GEAR CUTTERS

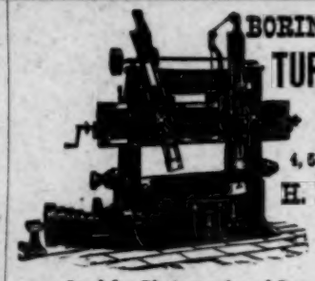
GEAR CUTTING OF ALL KINDS.

SUPERIOR MACHINE CO., CLEVELAND, O.

Don't Waste Money in Your Pattern Shop.

THE GOBEILLE PATTERN CO., Cleveland.

When you write to firms advertised in our columns, please mention the fact that you took their address from our paper. They will thank you for it.



BORING AND TURNING MILLS,

4, 5 & 6 Ft. Swing

H. Bickford,

Lakeport, N. H

Send for Photograph and Low Price.

OILLESS BEARINGS

For Loose Pulleys and other bearings. Perfectly clean. No cutting or danger of fire from overheating. Send for Loose Pulley circular.

No. American Metaline Co.

40 to 48 Third Street, Long Island City, N. Y.

F. B. Stevens

90 Griswold St., Detroit, Mich.

Fire Brick, Fire Clay and Foundry Supplies.

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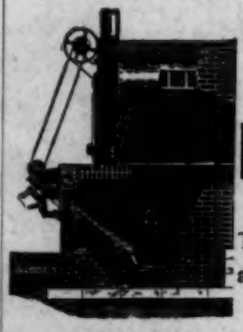
Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year $3.00.

N. W. TAYLOR. H. H. CAMPBELL.



Brightman Furnace Co.

648 Broadway, CLEVELAND, O.

SOLE MANUFACTURERS OF THE

Brightman Mechanical Stoker

FOR STEAM BOILERS.

THE MOST ECONOMICAL IN FUEL

and the Best Device in the World for Preventing Smoke.

Send for Catalogue "A."

THE Q AND C

Gen'l Offices Chicago Ill.

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AUTOMATIC FEED SHOP SAWS NO. 2 & 4. VALOUDE LARGE POWER AND PORTABLE RAIL

COLD SAWS

ENT FREE.

CORRESPONDENCE SOLICITED.

If you are thinking of enlarging your mill, foundry or machine shop, or of purchasing machinery of any kind, send us a line giving character of machinery needed. We can put you in communication with manufacturers from whom you can buy advantageously.

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Edward Brown,

ESTABLISHED 1866.

311 WALNUT St., PHILADELPHIA.

Manufacturer and Patentee

OF THE

Hot Blast (or Graphite) Pyrometer.—The only stationary Pyrometer now in use durable over 700 degrees.

The Standard Portable Pyrometer—For Blast Furnaces.

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Annealing Oven Pyrometer—to 3,000 degrees—of 1894.

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BRASS CASTINGS

for all purposes. PHOSPHOR BRONZE for Machine Box Bearings, etc. Special Finished Brass Work made to order.

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HIGH GRADE FIRE BRICK

ARE THE BEST.

MANUFACTURED BY

Reese, Hammond & Co.,

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Specialties: Tile, Grate Settings, Stove Linings and Difficult Shapes to order, Cupola Blocks.